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LOW VISION REHABILITATION II

Proceedings from the international
workshop in Uppsala, Sweden
25–27 September 1978

Project FOUKUS: Report No IX

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CONTENTS

PREFACE 1

INTRODUCTION 5

TEN PROFESSIONALS LOOK AT LOW VISION 9

- Barraga, N. A Program to Develop Efficiency in Visual Functioning 10
- Goodrich, G. Towards a Low Vision Rehabilitation Model 21
- Inde, K. Low Vision Training as an Educational Model in Sweden 43
- Khafizov, O. Protection of the Residual Vision of Those Working at Training-Production Centres of the All-Russia Association of the Blind 61
- Libman, E. Low Vision Rehabilitation System in the USSR 69
- Lindstedt, E. What is Low Vision? 83
- Nilsson, S.E. & U. Low Vision Rehabilitation 100
- Silver, J. Low Vision in the United Kingdom 117
- Skydsgaard, H. Low Vision Clinic Service - an Important Element in the Social Rehabilitation 140
- Tobin, M. The Assessment and Development of Visual Perception for Educational Purposes 152

PARTICIPANTS OF THE WORKSHOP AND AUTHORS OF THE ARTICLES 165

PREFACE

The problems of persons with impaired vision - the partially sighted - have been discussed by different categories of professionals over the years. The role of the partially sighted person between the sighted and the blind identity are frustrating and difficult to control.

It is also a problem whether organizations for the blind should also deal with persons with residual vision.

This book looks upon the problems of low vision from different points of view in relation to rehabilitation and use of the remaining vision. It is not, however, the intention to make a person feel as if he is sighted after the treatment or the low vision training. He is still a partially sighted person, but a person better equipped and skilled to use his residual vision. The patient's awareness, the realization of what kind of limitations he still has and how to live with them - all these aspects must not be forgotten. Apart from learning how to avoid frustration and how to get rid of the temptation to hide the handicap, thereby making himself unable to behave optimally in different situations, he must know how to handle the remaining problems. He must find his identity and play an adequate role.

Rehabilitation of persons with low vision must be made in a positive way. It is often more positive to tell the partially sighted person what he can still use, what part of the retina is still functioning etc. It is also the right of every partially sighted person to get the proper optical aids, necessary lighting and adequate low vision training to be able to use his residual vision. This right includes all persons with low vision, i.e. persons who have the sufficient vision to see light or take directions from it and use it for functional purposes. These persons should be organized in one organization which gives them this right as it is given to those who are blind, i.e. persons without any possibility to make functional use of their vision or persons who cannot see at all. There should be no controversy within an organization for all visually handicapped to work for these goals.

On the other hand, there are big disadvantages to have different organizations for the partially sighted and the blind. Many eye diseases are progressive. Low vision is often a stage on the way towards blindness. It is also very important in this situation to make use of the residual vision, even if it is temporary. A person should be given opportunity to use his vision - no matter for how long time the residual vision is estimated to last - if he is motivated to do so. This person should be able to belong to the same organization for visually handicapped - with or without residual vision.

In this book, and in this preface, the concepts of low vision, visual impairment, residual vision, partially sighted and visually handicapped are used in a somewhat confused way. Visually handicapped includes both totally blind persons and persons with residual vision, the visually impaired or the partially sighted. The two latter concepts include persons with low vision up to a visual acuity of 20/70 (6/18 or 0.3) or, if the central acuity of the retina is not impaired, with a visual field no greater than 20^o. Thus, among the persons with low vision there are individuals with different possibilities and difficulties to make use of their remaining eyesight.

However, seeing does not only involve the eyes or the degree of the residual vision. Motivation, personality, social background and other variables must always be taken into account. It is also a question of previous experience as a sighted or as a partially sighted individual when an image of the environment or a text on the retina should be interpreted. To perceive what you have around you is also a question of combining information from all senses. And when, being a person with low vision, I perceive what I have around me, I must use all my senses. My vision is not controlling the other senses as is the case with normally sighted persons. It is an integrated part of a perceptual system, controlled by other senses.

For a person with low vision it takes time to learn how to use low vision and to sort things out. This book gives the most recent aspects of these problems from different standpoints.

Bengt Lindqvist

INTRODUCTION

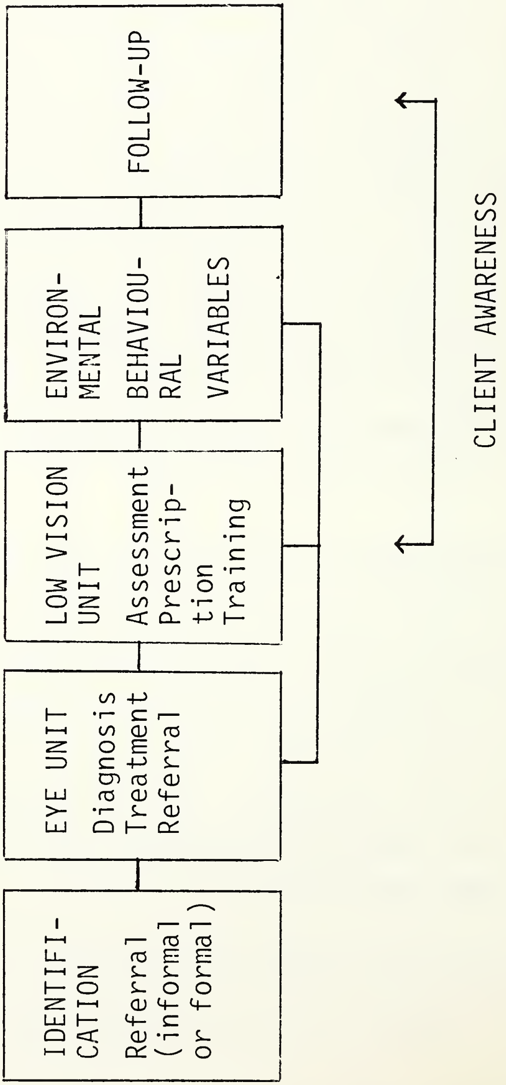
An international working conference met in Uppsala, Sweden, during three days in September 1978. The initiative of this meeting was taken by the chairman of the Committee on Rehabilitation, Training and Employment of the World Council for the Welfare of the Blind, Mr Bengt Lindqvist. The coordinator of international blindness research of the International Council of Educators for the Visually Handicapped, Dr Nils Trowald, Department of Educational Research, Uppsala University, was appointed by Mr Bengt Lindqvist to arrange "the Workshop on Low Vision Rehabilitation". The Swedish Board of Education provided the financial support to make the conference possible.

The participants selected were asked to present a paper relating to the presented topics of the conference and their respective special interests within the field of Low Vision Rehabilitation. This publication presents these papers in their edited and revised versions as the respective authors were given the opportunity to make necessary changes after the conference.

In a previous publication, "Low Vision Rehabilitation" - Report from the International Workshop in

Uppsala 25-27 September 1978 (Department of Education, Uppsala University - Uppsala Reports on Education, No 3), a model of low vision rehabilitation was presented.

THE MODEL OF LOW VISION REHABILITATION



In relation to each "box" of the model comments are given on definition of low vision, optical aids, training and development of low vision as to adults and children and the aspects of team work and follow-up.

A presentation of a model of low vision rehabilitation is, however, always an abbreviated version of this multidisciplinary area. Therefore, we have chosen to publish the following papers as the proceedings and follow-up of the previously presented model. In this edition professionals present papers within the field of low vision. They present their own views and the situaation in their respective country. The authors have a common goal which could be quoted from Resolution 13 from the 1974 General Assembly of the World Council of Educators for the Blind:

> "That the visually impaired be treated and thought of as 'seeing' persons rather than 'blind' persons and that every opportunity and encouragement be given to using the remaining vision in every area of functioning.
>
> That, in the education and rehabilitation of people with residual vision, each individual client should be regarded as having individual characteristics and needs, inclu-

> ding medical, vocational, occupational, psychological and functional capabilities, rather than as a group and that the effective implementation of this process calls for the involvement of multi-disciplinary but related professional personnel".

The papers have not been ordered as to what subject is described, but are printed alphabetically. Each article starts with a summary to make a choice of a special subject easier.

Our intention is that this book could be used as a reference by other professionals and as a textbook by students of different categories. It could also be seen as an overview of how far research and development within low vision had reached in 1979.

Krister Inde Nils Trowald

TEN PROFESSIONALS LOOK AT LOW VISION

ABSTRACT

Barraga, N.C. A Program to Develop Efficiency in Visual Functioning.

Learning through an impaired visual system occurs slowly, but follows the same pattern as visual development in a normal system. Even if the visual response is restricted only to light perception, visual stimulation must be intensified. Visual functioning is not automatic and spontaneous and is also related to other abilities. The capacity of learning how to function visually is unique. Visual development therefore demands among other things teaching and continuous stimulation.

A special program for learning visual efficiency has been designed with a diagnostic procedure, appropriate lessons and an instructional plan, and standards for rating progress.

A PROGRAM TO DEVELOP EFFICIENCY IN VISUAL FUNCTIONING

by Natalie C Barraga

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Historical Perspective

Since 1960, there has been a concentrated effort to foster the use of residual vision for functional purposes. Several exploratory and controlled research studies have been completed (Ashcroft, Halliday, & Barraga, 1965; Barraga, 1964; Holmes, 1967; Hull & McCarthy, 1975; O'Brien, 1971; Tobin, 1973; Tobin, et al., 1977). Materials have been published (Barraga, 1970; Apple, et al., 1970; O'Brien, 1971) which were designed to assist instructors in assessing and developing stimulation programs for more effective use of low vision. Evaluation of some of the materials has been completed (Ozias, 1975), and a new grant secured by the American Printing House for the Blind from the Division of Research, Bureau of Education for the Handicapped, United States Office of Education. With the cooperation of Dr. Barraga, the Utilization of Low Vision materials are being revised and expanded. The Program to Develop Efficiency in Visual Functioning will include a Diagnostic Assessment Procedure, A Design for Instruction, and a Supplemental Source Book along with basic materials for assessment and instruction.

Rationale for Program

An analysis of literature in child development and in visual perception led to the conclusion that:

> As far as is known from the evidence available at the present time, learning through an impaired visual system occurs slowly, but follows the same sequential pattern as visual development in a normal system (Barraga, Collins, & Hollis, 1977, p. 390).

Based upon the assumption that visual functioning is a part of perceptual learning, a matrix was designed to show (a) types of optical, optical and perceptual, and visual perceptual functions necessary for efficiency of performance in the visual system; (b) the visual task to be performed within eight major developmental milestones; and (c) the diversity of factors relating to environments in which visual tasks must be performed (Barraga & Collins, 1979).

The assessment procedure and instructional plan focus primarily on learners three years of age (chronological and/or mental) and beyond who show potential to progress visually (even though slowly). In considering the use of low vision, it must be remembered that no individual can function visually beyond the level of perceptual development or cognitive understanding at a point in time. The basic philosophy and assumptions upon which this program is based are as follows:

1. That any person who shows a response to light may be a candidate for further visual development or may respond to intensive visual stimulation.

2. That visual functioning and efficiency (in cases of impairment) is not automatic and spontaneous, but involves a process of learning and experiencing in real life environments.

3. That there is no evidence to indicate that the pattern of development in visual functioning in impaired persons differs markedly from that known to occur normally when there is no impairment.

4. That efficiency in functional use of vision is closely related to motor, mental, and emotional development.

5. That the capacity to learn to function visually is unique and that the rate of progressive development may differ in relation to the nature and extent of the impairment; the age of the individual, and the time in life when vision was impaired, and the encouragement and opportunities to learn to use vision in functional activities.

6. That evidence indicates that continuous stimulation, breadth of visual experiences, and intensive teaching is necessary for developing optimum efficiency.

Diagnostic Assessment Procedure

The Diagnostic Assessment Procedure is a clinical tool for derivation of specific information relative to visual functioning through identification of strengths as well as gaps or weaknesses. From this information, appropriate lessons within the instructional plan can be selected and/or individual plans can be developed for further increase in visual performance. The DAP includes: (a) a Low Vision Observation Checklist for recording observed visual behaviors in a variety of environments; (b) a set of 40 Assessment Items of increasing difficulty (both visually and cognitively) representing a sampling of possible visual tasks; (c) a Record Booklet for recording of behavior on each specified visual task including a Summary Table to show performance across all categories of visual developmental milestones; (d) an Instructional Planning Index, a guide to analyzing performance on all Assessment Items in relation to the type of instruction needed by the individual; (e) all concrete and graphic materials needed in the assessment process. Desired responses are specified for each task and mastery of all aspects of the task receives a plus (+). If an individual is unable to demonstrate proficiency on the visual functions required for the task a minus (-) for nonmastery is recorded.

Field Testing

As a part of the field testing by the American Printing House for the Blind, the Diagnostic Assessment Procedure was administered to 112 low vision learners in educational settings within the United States and Canada. Learners ranging in age from 5-20 years, with a median age of 10.5 years, were selected from both residential and public school programs. All learners were able to complete the entire assessment procedure. Reliability estimates for the Diagnostic Assessment Procedure were based upon internal consistency coefficients (i.e. Kuder-Richardson 20) and a correlation between preassessment and postassessment results. The reliability for the preassessment was r = .94 and for the postassessment, r = .96. The test retest correlation was r = .96. Results indicate a high degree of reliability.

Design for Instruction

In this portion, general suggestions are made for administration of lessons, consideration of the variability of individual characteristics of low vision persons, and the nature and type of responses which may be expected. Additional factors such as environmental conditions, psychological variables, interest and developmental level of learners, timing of instruction, and lighting conditions are also included. The sequence of 150 lessons is organized so as to interface with the visual functions and visual tasks in developmental milestones identified in the basic matrix. Behavioral objectives are specified for each lesson, as are learning activities compatible with age, interest, and environmental variety. Alternative adaptations are suggested for supplemental lessons, or ideas are included for breaking tasks into smaller incremental steps when necessary. Standards for rating progress and specific criteria for progression to the next lesson are identified. In some cases, repetition of the lessons, or provision of supplemental lessons or even termination of lessons, may be advisable in many instances since the sequence is only a guide for instructional planning. A rapid progression through the lessons with minimum levels of functioning could contribute to premature termination of instruction, and leave the person functioning with much less efficiency than might be possible had more time been taken on each lesson so as to achieve maximum efficiency over a broader range of functions.

Supplemental Source Book

The monograph includes topics of interest such as normal visual development, research on low vision, attitudes and philosophies about use of residual vision, and diseases or conditions affecting the eye. Additional discussion centers around lighting, magnification and low vision aids, communication between specialized and regular class teachers, and suggestions for parents, teachers and supportive personnel. The book includes also a list of commercial materials compatible with the eight categories of visual development and a complete glossary of terms relating to the eye, visual development, and presentation of the program. A comprehensive list of suggested readings on low vision completes the monograph.

Field testing of the DAP with the Instructional Program together are underway and the entire program will be available during the 1980-81 school year.

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ABSTRACT

Goodrich, G. Towards a Low Vision Rehabilitation Model.

Definition of low vision compared to the blindness definition is discussed. The need of training and of classification systems determining what kind of training should be used are also dealt with. Classification should, however, be used as general guidelines to avoid inflexibility and stigmatization. New diagnostic methods are presented.

Training includes making the patient aware of and understand his visual loss and remaining visual capacities. Training must always start with a high probability of success, more difficult material could be introduced later. Motivation and time are other factors relevant in a training situation. The patient's family should be involved in a low vision program.

TOWARDS A LOW VISION REHABILITATION MODEL

by Gregory L Goodrich

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Introduction

The Uppsala Workshop on Low Vision has outlined six topic areas for discussion. The areas are of particular interest at this point in time since each represents a complex and unanswered question. What is the definition of low vision? What diagnostic methods are useful and how can aids be provided? How are these aids best fit? How does low vision rehabilitation fit into an individual's life? And, how should low vision services be provided? These questions have not received satisfactory answers, in part because the area of low vision has only been recently recognized.

The field of blind rehabilitation has a long and distinguished history, yet it has only recently begun to accept the distinction between total blindness and low vision. Indeed it is still not uncommon to find low vision patients being blindfolded so that they can be "rehabilitated" as a blind person. Fortunately, such practices are becoming less common and a more progressive body of knowledge is developing. From this body of knowledge we can begin to develop answers to the questions posed for this Workshop.

Definitions of Low Vision

In the United States the legal definition of low vision is essentially synonymous with the definition of blindness. The beginning point is best corrected acuity of 20/200 and/or a visual field subtending a visual angle of 20 degrees or less. The ending point, or transition point, for low vision is not defined, but is presumably some vision better than simple light perception. The reason for the two definitions being synonymous is that there is no accepted definition of low vision. Since there is a definition of blindness, and since there is a commonality between the two, the definition of blindness is applied.

The legal definition can be easily contrasted with functional definitions. One functional definition is related to vocational or avocational performance. For example, an accountant with 20/100 visual acuity does not meet the legal definition of blindness. The accountant, if he cannot perform the job because of the visual loss, meets a vocational definition of low vision.

A social definition of low vision may be created if the low vision person has difficulty creating or maintaining social and familial relationships. For example, a person who requires a cane for street travel, but who can function visually in a near environment may be verbally ridiculed as a "street beggar" who is not really blind.

Mehr and Freid (1) have summarized these points in their definition of low vision. The definition is:

> "Low vision, partial sight, or subnormal vision may be defined as reduced central acuity or visual field loss which even with the best optical correction provided by regular lenses still results in visual impairment from a performance standpoint".

This definition clearly relates any performance deficit resulting from a visual impairment to the definition of low vision.

A more sophisticated definition has been proposed by Dr. August Colenbrander (2). This system uses three categories; normal vision, low vision and blindness with a supplementary classification of seven groups to more precisely define visual condition. A strong point of Dr. Colenbrander's definition is that it emphasizes the fact that vision and blindness are not absolutes. There are many functional categories of vision between "normal" vision and "total" blindness.

Such definitions of low vision are important because they are often used to determine eligibility for government services, education, and disability income. The definitions are also important because they provide the low vision teacher with information useful in prescribing aids and training. In this regard there are guides other than definitions which can also be used. The dicotomy of central versus peripheral field loss is one example. In general (and somewhat oversimplified) terms the individual with a central loss will have poor reading vision, but adequate travel vision. The individual with a peripheral field loss may have good reading vision, but poor travel vision. The dicotomy, therefore, suggests some necessary remedial training programs. The individual with a central loss may benefit from eccentric viewing training (3, 4), while the individual with peripheral loss may benefit from scanning and tracking exercises (5, 6).

An example of a classification system which is frequently used, and has a potential of being abused is that of age. In general it is felt that with increasing age the acceptance of aids (particularlay complex aids) will decrease. In some cases this belief may be warranted, however in our CCTV studies (8, 9) we have found that many patients in their 60's, 70's and 80's readily adjust to using CCTVs and optical aids. It seems that there may be a trend for decreasing acceptance of aids with aging, but it also appears that this must be determined on an individual basis, not as an inflexible rule. An exellent example of the usefulness of classification systems in determining low vision training and aids is presented in a book by Bäckman and Inde (7). They present four classifications (central scotomas, nystagmus, peripheral constrictions, and some forms of amblyopia) and suggest appropriate training.

A degree of caution must be exercised in using such classification systems to determine training programs and in prescribing aids. They must be used with a willingness to revise the prescription and training based upon the individual's actual performance with the aid and/or training. Some work has indicated that visual acuity is not a good predictor of reading performance (reading speed and reading duration). In one study (8) only 20 % of the variance in reading speed was accounted for by the variable of visual acuity. In a more recent study (9) of 100 closed-circuit television (CCTV) users less than 10 % of the variance in performance measures was accounted for by visual acuity. The percentage of variance accounted for was similar for performance with both CCTVs and optical aids.

The use of definitions and classifications can improve patient treatment and simplify communication. They can also lead to stigmatization and treatment based on tradition if used as inflexible rules rather than as general guidelines. Even as simple a measure as reading speed can be misused if a single measure is taken in isolation. In examining our training data over a period of time we have found many cases wherein a correct aid would have been prescribed if sufficient data had not been gathered over time and compared to performance with other aids (10).

Diagnostic Methods

The traditional diagnostic measures for low vision are near and distance visual acuity, visual fields (either confrontation, perimetry, or tangent (Bjerrum) screen), and various measures such as reading speed and reading duration. Several recent developments suggest useful additions to these traditional measures.

A new visual acuity chart has been introduced by Dr. Ian Bailey and Ms. Jan Lovey. The chart uses equal numbers of letters per line, has a relatively large number of gradations between 20/20 and 20/200, and is scaled in log units (11). Equivalent near acuity charts are also available. The chart is labeled both in meters and feet. The use of log scaling makes the chart an excellent research tool, since log transformations of psychological data (including acuity) provide a better distribution of data than is characteristic of untransformed (raw) data.

Spatial contrast sensitivity measures, such as Arden Plates, are also promising diagnostic tools. In a joint project with the School of Optometry, University of California, Berkeley, we are examining the use of spatial-contrast sensitivity as a diagnostic tool in predicting low vision mobility. Much of visually guided mobility can be described as extracting figure from ground, thus an individual's spatial-contrast sensitivity may be a critical variable. Preliminary data indicates that mobility performance (in visually avoiding objects and maintaining orientation) is related to spatial-contrast sensitivity performance, however, more data is needed before a final conclusion can be drawn.

A less traditional diagnostic tool has been developed at the Western Blind Rehabilitation Center. A series of 18 test routes (from simple urban settings to complex business settings) have been devised. These allow testing the patient's mobility skills in a variety of setting. Notations are made concerning the patient's ease of difficulty in negotiating each route and detailed records are kept indicating specifically which aspects of a given environment presented difficulty. A single subject will not be asked to walk each route, but the level of difficulty will be gradually increased (perhaps skipping intermediate routes if past performance warrants) until a level of difficulty is reached such that the patient can no longer safely and efficiently travel. The results of this testing are supplied to the low vision clinic to aid in prescribing mobility aids and are used by the mobility instructor in formulating the patient's mobility training program.

Methods in Training

Historically low vision aids have not been readily accepted by low vision patients (12, 13), although recently a few practitioners have reported success rates of 85 % to 90 %. Part of the reason these high success rates must be attributed to the skill of the practitioners. Since they also report providing training in the use of the aid it appears that this training may also be valuable in promoting high rates of user acceptance. Our own studies of practice and training support this conclusion (7, 9).

If training is as valuable as these studies suggest it is unfortunate that the low vision literature does not contain a larger body of information on how the training is to be accomplished. The training can be aimed at either (or both) of two goals: improving the patient's ability to use an aid or at improving his/her ability to utilize their residual vision.

Training designed to improve the patient's use of an aid will emphasize:

1. The type of material to be seen
2. The physical structure of the aid
3. The visual field of the aid
4. The magnifying or minifying characteristic of the aid
5. Focusing the aid
6. The limits of the aid in terms of types of conditions it will and will not be useful
7. Lighting conditions necessary to obtain optimum performance
8. The best means of holding and steadying the aid
9. Scanning and tracking techniques
10. In the case of electronic aids (e.g. CCTV) the mechanical and electronic controls of the aid. Some aids (e.g. a typoscope) will not require extensive training, but the teacher should ensure that the patient understands the full range of uses of the aid.

Training aimed at improving the patient's sensory-perceptual skills will emphasize the patient's understanding of:

1. The visual loss and remaining visual capacities
2. Perceptual constancies (e.g. near objects appear lower in the visual field than distant objects)
3. Effects of light and shadow
4. Techniques for visually scanning and tracking
5. Techniques to maintain a steady fixation
6. The use of other senses to supplement the visual system
7. Geographical constancies (e.g. typical locations of street signs, addresses on buildings, etc)
8. Techniques to obtain increased magnification without optical aid (e.g. approach magnification, large print materials)
9. Cognitive strategies to help interpret ambiguous stimuli (essentially a reasoning process, for example, if a doorway is difficult to visually locate on one can watch the direction taken by others)
10. Techniques to optimize visual acuity (e.g. eccentric viewing training).

Regardless of whether the training is aimed at improving the patient's use of aids or of using residual vision the training should take into account several factors. First, the patient's initial work should be conducted so that there is a high probability of success. In prescribing a magnifier, for example, the patient should intially read large enough print that it is very easily seen. More difficult materials can be introduced later, but it is important for the patient to develop confidence and an expectation of success to counteract previously learned expectations of failure. This "easy-to-hard" progression should be followed whenever a new training technique or aid is introduced.

Second, while standardized materials are beneficial in quantifying and standardizing performance scores it is helpful to have the patient read material relevant to his/her goal. The material can be related to either vocational or avocational goals, but it must be material the patient is interested in reading. In our clinic we have found as diverse a set of materials as law books, Playboy magazine, and race track betting sheets to be very helpful in motivating some patients. If variables such as visual acuity and visual field have little correlation with performance the variable of motivation (predictably) appears to be very powerful (14), and can be used to improve performance.

The element of time is a third factor to be considered. While patients show a great deal of intersubject variability it appears that learning to use low vision aids may require many days or weeks of training. CCTV and optical near aids may require more than 10 days of intensive training and some sensory-perceptual training may require 12 to 15 days (3). Sufficient time should therefore be allowed for training and for individual practice with the aid or technique. The additional training may make the difference between an aid of potential value and an aid that is actually used (15).

A final element to consider is that low vision aids or training are best conducted with the active cooperation of teachers and family members outside the low vision clinic. The mobility instructor should be aware of the prescription of telescopic aids and have sufficient knowledge to help the patient learn the use of the aid. The mobility instructor should also be aware of any training being conducted such as eccentric viewing training. This will help ensure that the training is transferred from the low vision clinic into the patient's daily activities. Family members can also be an important source of reinforcement for the use of aids and training, and an active effort should be made by the low vision staff to involve the patient's family in the low vision program. Their familiarization should emphasize the patient's abilities, but it should also include information about the patient's limitations. Without this element of caution the patient may inadvertently be placed (or place himself) in a hazardous situation.

A Low Vision Rehabilitation Model

Low vision clinics have been successfully established in rehabilitation centers, hospitals, and universities. It seems unlikely that there is only one correct setting or model for the delivery of low vision services. Still, the most successful low vision clinics offer many common services. The following model addresses these common services and presents them as the minimum necessary requirements for a successful low vision program (which offers services to a wide variety of clients).

The model is designed to revolve around the patient and the program will vary from patient to patient depending upon individual needs, goals and capacities. A flow chart of the model is presented in Figure 1.

Starting on the left side of the flow chart the patient (or student) is referred to the low vision clinic. An initial evaluation of the patient is conducted including measures of visual acuities and visual fields, demographic (case history) data, an assessment of current visual ability, an assessment of visual needs, lighting conditions in the patient's home, school, employment, etc, and visual pathology and prognosis. If the patient has not recently been seen by an ophthalmologist the low vision clinic will refer the patient for an ophthalmological examination and treatment if necessary. The latter step is essential since the prescription of aids and training can best be accomplished if the pathology is as stable as possible.

Once the initial evaluation has been completed the results are forwarded to the optometrist (or ophthalmologist) who will be responsible for prescribing the aid(s). Optimally, the low vision teacher (who conducted the initial evaluation) will actively work with the optometrist and the patient during the examination and development of the prescription and necessary training. The solid and dotted arrows of the flow chart are designed to show the need for continued communication between all parties.

Concurrent with the low vision evaluation the patient may also obtain services from psychologists, social workers, rehabilitation teachers, mobility specialists or a variety of professionals in related disciplines. When appropriate for the patient these services can be as valuable to the patient as the prescription of an optimum aid or training program.

The outcome of the initial evaluation and low vision examination will be a tentative prescription for an aid(s) and a training program. The nature of these prescriptions will vary from patient to patient depending upon individual needs. The low vision teacher will work closely with the student in a variety of training procedures until sufficient training has been received, or until it is evident that additional low vision examinations are needed to provide an optimum aid and/or training program.

A number of training options, both with and without an aid, are listed near the middle of the flow chart. These are divided into distance training (generally a distance of 3 meters or more), near training (generally a distance of 50 centimeters or less), and visual development training for specialized tasks (which frequently involve working distances between 50 centimeters and 3 meters). Examples of the activities some clients have engaged in which required the development of this third category are warehouseman, mechanical repair, carpentry, farmer, reference librarian and dispatcher.

To the right of the three general training categories are examples of the types of training which can (and should) be offered in the low vision clinic. Some types of training (e.g. CCTV training, work with lighting, eccentric viewing training etc) may be accomplished solely by the low vision teacher. Other types of training (e.g. monocular training, typing etc) may best be accomplished by the low vision teacher working with the patient's rehabilitation teacher or mobility instructor. Family members may also be desirable in the teaching process since they are readily available to reinforce the patient in successfully using a given aid or technique and because they can often help the patient practice with aids or techniques.

The aids a patient uses during training should be provided on a loan basis. This prevents the patient from purchasing aids which are not beneficial. It is also adventageous, when working with complex aids (e.g. CCTV) that the patient receive the aid he/she has been trained with. The reason for this is simply that some aids will have small idiosyncrasies which the patient learns to use during training. Issuing the aid used in training eliminates the patient having to relearn these characteristics. Whenever possible the aids should be provided to the patient on the basis of need and ability to utilize the aid. In cases where the patient must purchase the aid, the cost should be kept as low as possible. A strong argument can be made (on both humanistic and economic grounds) that governments should provide aids to their citizens as they are needed, without charge. The return to the government results from the increased independance of the low vision persons and their (often) increased productivity. Both of which financially reimburse the government for their costs.

Summary

The organizational model of low vision services presented here provides a comprehensive delivery system which takes into account the patient's medical, social, psychological, and visual needs. Among its particular strengths are:

1. A team approch to low vision rehabilitation
2. Excellent lines of communication between patient and professionals
3. Emphasis upon the patient's individual needs
4. A flexible program which can be tailored to meet individual needs
5. Inclusion of the patient's family in the rehabilitation process
6. Inclusion of services for medical and/or psychological needs
7. An integration of disciplines so that treatment is a unitary process
8. And, prescription of aids and training based upon objective criteria.

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ABSTRACT

Inde, K. Low Vision Training as an Educational Model in Sweden.

Describes low vision training in a unique organization of Low Vision Clinics and rehabilitation programs over the country. Divides visually impaired into different categories with a learning program for each one of these groups. Reading is compared with normally sighted persons and the performance used in the developed programs. Special interest is given to methods of eccentric viewing and specially to the way low vision teachers work. Low Vision Rehabilitation is described as a team work, where the low vision teacher is responsible for the training and follow-up of the patient's utilization of residual vision.

Emphasis is made on the patient's awareness and knowledge of the symptoms of his eye disease.

LOW VISION TRAINING AS AN EDUCATIONAL METHOD IN SWEDEN

by Krister Inde

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Rehabilitation in Sweden

Rehabilitation for visually handicapped adults was established in Sweden twenty years ago. The Board of Education has the responsibility for the vocational training located at six towns all over the country.

Partially sighted are referred to Low Vision Clinics that today cover most of the country. These clinics are administered by County Council of Health and Social Welfare.

At the clinic the low vision teacher has the responsibility for the training program, the use of optical aids, illumination, etc. The optician and the ophthalmologist take part in the team work with their knowledge within the technical and medical fields.

Special courses for elderly are administrated by the Board of Education. Three teams of four teachers travel around the country during three months of the year giving courses for four weeks. During the rest of the year they give courses, where the visually impaired come to them and the training takes place at special schools. Also on these courses low vision training will be of greatest importance.

No controversy

There is today no controversy in our country whether low vision training with optical aids is needed or not. Of course, the hard times in the early seventies when the pioneering work was done, also meant persuation and confirmation of the necessity of low vision training. Today no one questions the meaningfulness of a comprehensive and individually adjusted sight training program. Private opticians do not supply optical aids to patients with low vision, but would instead recomment the patient to the Low Vision Clinic at the County Hospital.

Development

A new guideline was made in 1971 for rehabilitation courses for "the blind". A national investigation had, however, shown a need for special rehabilitation techniques concerning the partially sighted. This led to experimental and explorative work in two places in Sweden - Uppsala and Furulund - concerning the new subject optical rehabilitation and low vision training for the visually impaired.

In 1975 a book was released by my collegue Örjan Bäckman in Uppsala and myself, by that time working in Furulund. The book contains the theories needed for a visually impaired person to understand the function of his eyes, the optical aids and other equipment in the training situation. There is also a learning program for each of the four different types of symptoms of visual impairment. The title of the book is in translation "Visual Training with optical aids" (Swedish: "Synträning med optik". 1975. Hermods. English translation: "Low Vision Training. 1979. Liber Hermods).

Low Vision Clinics

Today low vision training is an established subject within the six rehabilitation courses in Sweden. But it has also been possible to expand the training and the optical work to an organization within the eye clinics in each of the biggest hospitals in every county.

Low Vision Clinics have been established in 20 places during the last three years. The most important development within the Swedish Low Vision Clinics has been the emphasis on the educational aspect.

The aim is to establish 31 Low Vision Clinics before 1985. Each Low Vision Clinic will have a population of 250 000 - 300 000 inhabitants and not only see to the low vision aspects - even if that is the main problem. The thought is to involve social workers and pre-school counsellors to strengthen the organization. As Low Vision Clinics are today under development, the different clinics are very heterogeneous. The Board of Health and Social Welfare recommends, however, the 27 different counties to develop and start Low Vision Clinics according to a full scale service for all visually handicapped in each county.

The low vision training is led by a specially trained teacher called a low vision teacher. This person gets his/her education at Teachers' College of Special Education of Stockholm for one year, and we just ended the third year with a very good educational result. The low vision teacher works within a team which also includes an optician and an ophthalmologist but it is strongly stressed that the low vision teacher should have the responsibility for the Low Vision Clinic. Today we have 23 low vision teachers in Sweden.

Some conditions under which aids are made available

In Sweden we have some conditions that might be special for our country. All optical aids and most of the other equipment such as lighting, special desks and manuscript holders that are needed, can be "prescribed" by the team of the Low Vision Clinic for individuals of all ages. At school, the pupil's community school must pay for the costs of special equipment needed for his school work. The Employment Office pays for aids needed in the work situation, and the County Board of Health and Social Welfare pays for aids needed in activities of daily living. This means that most people have economical resources available to obtain optical aids. As a result we have a rule saying that any handicapped person who gets an aid *should be able to use it correctly*. Consequently, we believe that without a special training program led by a specially educated low vision teacher, it is impossible for a person with a visual impairment:

- *to understand* his own eye disease and its symptoms, and
- *to be able to use* correctly the optical aids and other equipment in relation to the residual vision.

This is the background concerning *low vision training* and optical rehabilitation in Sweden.

The four groups

Persons with visual impairment are divided into four groups. A visually impaired person will fit into one or more of these groups according to the symptoms of his eye disease or injury.

The first group consists of *persons with central scotomas*.

The second group are persons with severe difficulties to control their eye movements (nystagmus).

The third group are persons with a limited peripheral visual field but with central vision.

Finally the fourth group are persons with other forms of low vision, such as hyperopia and myopia gravis, retinopathia diabetica, amblyopia, strabismus etc.

Group one

Most of the visually impaired belong to the first group, i.e. those who cannot use the macula, and can neither read nor see details at a distance. The majority of the Swedish population with visual impairment have some residual vision, and the most common cause of visual impairment is senile macula degeneration. Other diseases with symptoms that fall within group one are neuritis opticus, toxoplasmosis, chorioiditis retinae etc.

As these persons cannot use their macula, with its high density of cones, we have to teach them to move their eyeball up- or downwards so that the image will fall above or below the central scotoma. However, outside the macula the density of cones is much lower - although there are cones all over the retina. To compensate for the lower density of cones one must enlarge the image according to where on the retina it falls in relation to the fovea centralis. The new "false" macula is decided by the size of the scotoma. It is important to place the image (by eccentric viewing) just outside the scotoma in order to avoid more enlargement and a bigger angle of eccentric viewing than necessary. The further you get from the fovea centralis the higher enlargement and thus the shorter reading distance. The question whether you should fix above or below the text is also determined by the nature of the scotoma.

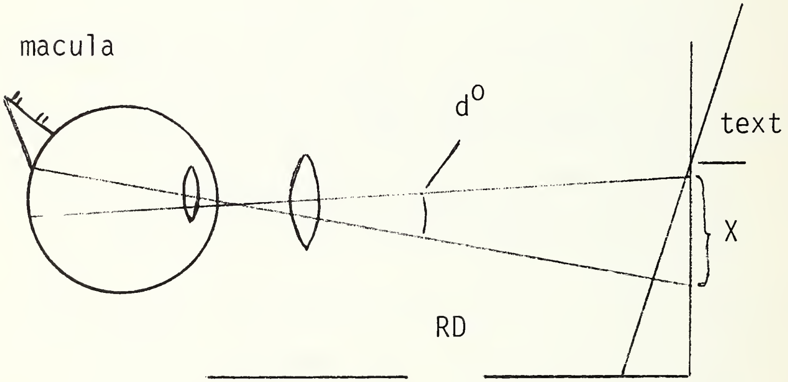
The person must be aware of his visual field diagram and understand the procedure. Then he must know how many degrees above or below the text he should look. This can be measured by a trigonometrical formula:

$$\tan d^{o} = \frac{X}{RD}$$

d = degrees from fovea centralis where you should focuse the image

RD = reading distance which you get from the inverted value of dioptries in the aspherical lens

X = the distance from the text to the place above or below it where you should fix to avoid the scotoma



The person in this example must then learn how to move the text and at the same time hold his best eye with the accomodation aid (in the form of a strong positive plastic aspherical lens) in the right position. While the text is moved the eyes will make a sliding fixation and then quickly return to make a new sliding fixation and so on. Normal readers move their eyes in small movements with pauses in between. "Reading" takes place during these pauses - the fixations. Normal readers have a reading distance of 35 - 45 centimeters whereas the visually impaired have a reading distance of 2 - 10 centimeters.

Why the temporal or nasal fields are not used relates to the fact that a fixation field should be as wide as possible in the horizontal line to give the best conditions for a high reading rate. (Perhaps the Japanese readers benefit more from a high vertical visual field?) The patient can, however, benefit from the use of nasal or temporal residual vision while using eccentric viewing in a viewer or when not using any aid at all, i.e. when playing table tennis or cycling. (My own experience as a member of group one tells me that).

The theories of group one are simple, but there are many problems with this type of visual impairment. These problems can only be overcome and solved by learning to use such special techniques and attitudes as those taught by the low vision teacher.

Group two

The second group of visually impaired are those who cannot control their eye movements (abnormal nystagmus). This defect degenerates from poor vision in early childhood or has a congenital origin. Diagnosis such as congenital cataract, albinism or congenital nystagmus are common together with abnormal nystagmus.

These persons must also learn a new way of reading. Instead of moving the eyes when reading, the teacher instructs them to move their head and thus keep their eyes as steady as possible in a position, where the abnormal nystagmus is as small as possible. The reason is that moving eyes will increase the uncontrolled eye movements.

Furthermore, one must avoid accomodation and convergence which can multiply the nystagmus. Monocular occlusion could also cause an increase of the nystagmus. Thus, training people belonging to the second training group to read, involves a new way of fixation movements.

Group three

Persons who are not able to use the peripheral parts of their retina but do have residual vision in the central parts of the retina, belong to the third group. They have problems when travelling without using a white cane after dark, but with relatively small enlargements from the use of different optical aids (according to their visual acuity) and with good illumination they are able to read normal print. Their reading problem is that they have a limited number of letters in each field of fixation, which decreases their reading rate. Therefore they must learn to move their eyes in shorter and more exact distances and to pause more often in each line of text. Another way of reading is to keep the eye as still as possible and move the text into the residual central vision. If the residual vision is placed eccentrically over the fovea centralis, the patient, consequently, must fixate eccentrically according to the methods of group one.

Group four

The fourth group contains persons with amblyopia resulting from neglected strabismus with an injured better eye, persons with myopia or hyperopia gravis and the majority of persons with retinopathia diabetica. These persons can often read in the "normal" way (without fixing their eyes in other angles, without moving their head instead of their eyes, and so forth). However, they must use optical or other aids because of their low visual acuity. As the case is with all low vision patients, they should train perseverance, adjust to a short reading distance and adjust to other "inconveniences" in this new situation.

The team work assessment and the application of optical aids must be done by an optician in cooperation with the low vision teacher. In most cases the ophthalmologist is a consultant who is available for approximately 4 - 6 hours a week. The team is led by the teacher, who also has the responsibility of seeing that the aids are used to an optimum and that the aids reflect the needs of each person.

Use of optical aids is not only training a person how to read. Reading is, however, one of the biggest needs of the persons at the clinics. Activities such as writing, sewing, cooking, etc must also be represented in an applied training program. However, I have limited me to the problem of reading to give a theoretical survey of the service given to visually handicapped in Sweden. I have not mentioned the need of an optimal illumination to certain categories of partially sighted. It is, especially in a work or a school situation necessary that many types of service can be coordinated. The applied training should be done on the field, where the patient has discovered the problems. The teachers and the optician should not stay at the clinic all the time. They should be out of there at least one day a week.

Why low vision teachers?

One of the reasons for low vision teachers is to see to it that the visually impaired persons have a possibility of learning how the aids work and how they should use them in accordance with their symptoms described above. In Sweden we have approximately 80 different optical aids registered in a catalogue in which technical and other commercial data of each aid could be found.

However, the most important part of any educational effort is the possibility to motivate the pupil. This should be done by persons trained and fitted to do such a job. They are trained teachers, occupational therapists or have corresponding academic education. After that they should have practised for more than three years in a normal school situation.

Low vision training in Sweden has reached a level where it has found an organization within the county-based Low Vision Clinics and also as a subject within our special schools for visually handicapped children. It is an important part of the rehabilitation program of adults. Research must now be carried out to improve the practical part of the training and the optical aids so that these two parts will suit each other better.

Low vision training is an alternative for persons with progressive diseases. Instead of making a person blind in advance, he is now able to use his sight as long and as much as possible. One should never allow a person to use techniques for the blind as long as he is reading ink print faster than Braille. Why should the partilly sighted use resources that belong to the blind when they do not need them?

Low vision training is a revolution for persons with residual vision and for the old establishment of schools for the blind and also for the old no-good saying: "Take care of your eyes - save them!" Today we would rather say: "Take care of your eyes - use them!"

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Inde, K. 1978: Low Vision Training in Sweden. Journal of Visual Impairment and Blindness.

ABSTRACT

Khafizov, O. Protection of the Residual Vision of Those Working at Training-Production Centers of the All-Russian Association of the Blind.

Protection and use of residual vision at special working centres are desribed. About 60 % of all legally blind persons in the USSR are estimated to have residual vision. The working environment is made comfortable and adequate in order to make use of residual vision possible. Special medical centres give service in this direction. Special limits of optimum lighting for different eye diseases have been established. For some persons with residual vision due to special causes, protection is more appropriate than use of the remaining vision in order to stabilize the vision left.

PROTECTION OF RESIDUAL VISION OF THOSE WORKING AT TRAINING-PRODUCTION CENTRES OF THE ALL RUSSIA ASSOCIATION OF THE BLIND

by Ousman Khafizov

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Employment for all the visually handicapped in the USSR is practically achieved now. All the blind people having special secondary and higher education are employed in accordance to their profession. Those not having special education are mainly employed as workers of training-production centres of the All Russia Association of the Blind.

One of the most important tasks of the training-production centres of the Association is the protection of the residual vision, touch and hearing, as well as creating comfortable working conditions, contributing to stabilization of the disturbed vision and full-value activities of some analyzing systems that compensate visual impairment.

In order to fulfil these tasks special medical rooms are arranged at training-production centres of the Association. They are equipped with the modern medical facilities.

Physicians and paramedical personnel arrange regular examination of the visually handicapped. So, primary health care is performed here. Ophthalmological services are of special importance. Eye doctors in polyclinics arrange examination and treatment of all the visually handicapped working at training-production centres.

Several scientific-research institutes of health and social welfare are engaged in the research in the field of the prevention of blindness and methods of its treatment.

These institutions are also achieving regular examination of the visually impaired and arrange clinical treatment if needed. A special Medical Rehabilitation Centre for the Visually Impaired was founded in Moscow.

Thanks to these activities thousands of blind people became sighted or their vision was improved.

According to the statistics about 60% out of the whole number of people that are legally blind have a certain percentage of residual vision. Bearing this in mind, the All-Russia Association of the Blind together with scientific institutions carries out the work aimed at the gainful employment of the blind at various medical and social institutions. Medical aspects of that research aimed at the development of the recommendations for the utilization of the residual and weak vision in the working process at its different acuity and forms of pathology, as well as at the determining of the negative conditions of work that badly influence visual pathology. For example, people with some eye diseases especially of infectious-allergic nature can not work in bad meteorological conditions, that may cause recurrence of the process. In accordance to that and to the sanitary standards the temperature in the working area should be 20-25^{0} C and the humidity 60-30 %.

The control of the concentration of bad substances and sprays in the air is very strict at the enterprises of the Association, as they may badly influence the eyes, especially in case of atrophy of the optic nerve.

Sanitary standards in the country determine very clearly the name of substances and their possible concentration in milligrams per a cubic metre of air in the working area.

Optimum level of lighting of the whole of the premises and of the working area exactly is of a very great importance.

Soviet scientists have developed permissable limits of lighting level at working areas for all the most common forms of ophthalmological pathology.

For example, in the case of high myopia or glaucoma, or the atrophy of the optic nerve, cataract and some other diseases, the lighting level should be 250-270 lux. In the case of the parallax of lens and keratitis the lighting level is limited up to 100-125 lux. Making the lighting level higher or lower than the permitted limits makes working conditions worse. While deciding questions of lighting one can remember about spectral composition of the light flow, the stability of its level, absence of direct and reflected glitter, the gap between lighting levels of the working area and of the environment.

The recommended levels of lighting can be easily achieved with the help of the individual lamps with the regulator of light intensity.

The possibility for the blind to use the residual vision in the process of work is very important and depends upon two factors - the level of the vision deficiency and the nature of eye pathology - that have to be considered as a reason for certain recommendations with regard to the utilization of the vision in the process of work.

Considering the fact that in some eye diseases the constant utilization of the residual vision in the process of work may badly influence the course of pathology process, ant to work in "a blind" way is impossible for most of the blind having some residual vision, these people are given such kinds of work, that do not demand a constant visual control. In such cases residual vision is used only for orientation and for finding big parts and details that are used in the process of this work.

In many forms of eye pathology, such as a complicated myopia, vascular disorders, some lens diseases and physical stress can bring serious complications such as haemorrage of retina, parallax of lens, detachment of the retina etc.

Development of sensory aids is of great importance in the protection of the residual vision. Industrial sensory aids are developed and performed by the specialists of the Association. These aids help the partially and weak sighted workers to fulfil complicated operations without using their residual vision as well as to follow the quality demands.

Properly arranged vocational training at the enterprises of the Association is one of the measures aimed at the protection of the residual vision. According to the programme 50 % of lessons are given to theoretic courses and 50 % to practical work.

We find it very important for the trainees to try to work by "a blind" method from the very beginning. The instructors explain to them that the high productivity of work depends upon the experience.

The combination of scientific arrangement of work of the visually impaired at the enterprises of the Association with the highly qualified ophthalmological and health care services will establish both the stabilization of the impaired vision and the improvement of rehabilitation of the blind and partially sighted in the USSR.

ABSTRACT

Libman, E.S. Low Vision Rehabilitation System in the USSR.

The Rehabilitation program is defined by the type of eye pathology, nature and degree of visual disorders, quality of preserved visual function, time of onset and duration of low vision. Other factors are age, education, prognosis, and curability of the disease, work experience and social, psychological and personality patterns. In all republics of the USSR evaluation of the above factors are effected by specialized commissions (VTEK).

Special emphasis is made on preservation and improvement of vision of the young generation.

Employment plays an important role, and in this connection, a profound evaluation of suitable job opportunities is made either in higher education, in special production centres or other enterprises.

Partially sighted with a visual acuity less than 0.1 - 0.2 work in production centres. On a "Reference Table" the type of employment could be determined that corresponds to the disease.

LOW VISION REHABILITATION SYSTEM IN THE USSR

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General Outlines

Rehabilitation of sick and disabled persons is considered one of the most important medical and social problems of today engaging the minds of advanced people in many countries all over the world.

Humanism, social significance and sharp urgency lie in the background of broad involvement of efforts in the field of studying different aspects of rehabilitation theory and practice.

The Soviet government maintains regular control of health and social welfare of disabled people. The rehabilitation programme for persons with impaired vision is stipulated in a number of state acts. Much attention is being paid to the development of theoretical basis and provision of rehabilitation services for the disabled, including the visually handicapped.

According to the modern conception, rehabilitation is conceived as a process and system of planned actions aimed at restoring somatic, personality, social status of an invalid through comprehensive utilization of adequate state, economic, medical, vocational, pedagogical programmes.

This conceptual basis underlying the need for unity and interaction of biological and social factors, comprehensive and consecutive character of accomplishment of various medical and social restorative measures serves as the main principle in setting up a low vision rehabilitation system in the USSR, in moulding its organizational and structural forms.

The enormous practical experience of national associations of the blind, especially that of the All-Russia Association of the Blind as well as the diverse investigations conducted on the relevant problems by the institutions within the framework of the Social Welfare, Health, Education and other departments, ensure a considerable progress in establishing rehabilitation services for visually impaired people.

Rehabilitation Programme

As its major components, the low vision rehabilitation programme envisages restorative treatment, vocational guidance, vocational training, rational employment. Meanwhile, the context of each of these steps and the rehabilitation programme itself are determined with strict differentiation as to the medical, socio-vocational data accounting for the disablement of a patient and in accordance with the degree of clinical and functional, personal, socio-environmental possibilities of his rehabilitation. In this connection, along with a certain unification of typical forms of rehabilitation, the programme remains purely individual and is defined by the type of eye pathology, nature and degree of visual disorders, quality of preserved visual functions, time of onset and duration of low vision, occurrence of accompanying diseases, prognosis, curability of the disease as well as by the age, educational level, trade, work experience of a low vision client, his personality patterns and psychological peculiarities, his social environment.

The comprehensive evaluation of the total combination of medical, biological and socio-vocational factors is effected by specialized ophthalmic, medical and vocational assessment commissions (VTEK) established in all the republics and some larger administrative divisions of the USSR. The commission is composed of ophthalmologists, therapists, neurologists and social workers. The principal function of the assessment commission is to assess the working capacity of an invalid and develop the client's medical and social rehabilitation programme. Commissions are often assisted in their work by consulting doctors and production representatives.

The medical rehabilitation of the partially sighted is undertaken in the USSR in the form of broad-scale research and organizational programmes dealing with elaboration and realization of effective methods of restorative treatment of persons with severe visual impairments. In the first place, we describe to them invalidating and socially significant forms of pathology, such as progressive myopia, consequences of eye injuries, cataract, glaucoma, congenital and adventitious diseases of cornea, retina, optic pathways, uveal tract and others.

The low vision rehabilitation treatment is available free of charge in highly skilled ophthalmic departments, clinics, research institutions. Special departments (centres) have been set up in a number of republics for delivering medical rehabilitation services for the visually disabled. Considerable advancement of modern ophthalmology, especially that of ophthalmosurgery, development and employment of reconstructive operations, improvement of correcting aids make it possible for low vision individuals to improve their visual potentialities. The important form of medical rehabilitation is a dispensary supervision of all partially sighted patients by oculists and internists of medical institutions who maintain systematic control of the state of their health and deliver an appropriate medical assistance. The production centres of the Associations of the Blind incorporate health units, the medical personnel of which untertake a diversity of medical preventive programmes in order to promote health and preserve remaining vision of partially sighted workers.

There is a wide range of health resorts, resthomes, preventoriums for recreation and promotion of health of severely visually impaired people.

Particular emphasis is made on preservation and improvement of vision of the rising generation - schools for partially sighted children provide along with training skilled medical supervision and treatment of the pupils.

Vocational guidance of low vision persons is undertaken by specialists of ophthalmic, medical and vocational assessment commisions and treatment and prophylactic institutions on the basis of joint analysis of the above factors underlying the vocational abilities of a low vision individual. Among medical and social data special interest is attached to the cause and profundity of an impairment of visual functions, prognosis, level of adjustment and compensation for the existing visual defect, mobility and social integration of the individual. Modern principles of vocational rehabilitation have been laid down in the result of multi-disciplinary studies in the field of ophthalmology, ophthalmoergonomics, vocational physiology etc which have produced new scientific data on functioning and visual capacities of persons with different forms of eye pathology, revealed presence of compensatory mechanisms in the visual system ensuring its functioning under the conditions of visual defect, verified the response of various eye structures and organisms of a low vision client to certain types and settings of employment.

Vocational training of people with low vision is provided in technical colleges and professional technical schools where students acquire work skills, accessible and indicated to them. Of great importance is vocational training and re-training of low vision clients immediately at the production centres, and specialized workshops of the Associations of the Blind as well. Training is conducted with regard to a broad involvement of vocational skills and knowledge of the workers. A certain part of low vision individuals, especially the most capable graduates of schools for visually impaired children, go to higher educational establishments in order to receive an appropriate profession which will facilitate their placement in intellectual occupations. All kinds of vocational training of partially sighted people are available free of charge in the USSR, payment of scholarships being secured.

Rational employment serves as the principal element of socio-vocational rehabilitation of people with low vision. Its major objective is that of enabling an invalid to participate in socially useful labour, this being achieved through securing him with a job that would not affect his state of health and, primarily, the course of illness which led to impairment of his working capacity, and that would ensure a high level of social rehabilitation of the invalid. For each disabled person whose state of health does not exclude him from labour, the assessment commission makes a conclusion on conditions and type of employment, the conclusion being binding by law for the management of enterprises, institutions and organizations. The commission's recommendations and vocational guidance as well, are provided on the basis of a comprehensive evaluation of the whole range of clinical and functional, social, vocational and psychological characteristics of a low vision individual in accordance with the scientific data on possible types and conditions of employment with regard to different forms of eye pathology and state of visual functions.

Partially sighted people with most severe eye diseases, partly taking a progressive course, and reduction of visual acuity up to 0.1-0.2/ 6/60 - - 12/60 or constriction of visual field up to 35^{o} of the only seeing or better eye, work mostly at the training production centres of the Associations of the Blind where special conditions are provided to comply with the functional abilities of visually impaired people. These centres appear to be highly developed industrial establishments with complicated modern technology, often cooperating with larger enterprises of regular industry. High scientific management of labour, mechanization and automation of the production, broad employment by means of typhlotechnology enable a low vision worker to perform complex production operations.

For the purpose of maximum enhancing low vision employment the scientists of the Central Research Institute of Vocational Assessment and Placement of the Disabled within the Ministry of Social Welfare of the Russian Republic together with the workers of the Central Board of the All-Russia Association of the Blind have carried out a wide range of sociological, hygienic, clinical, and functional researches which resulted in the development of a scientifically based system of placement of partially sighted clients at the training-production centres. The system is based on the principle of conformity of the clinical state and functional abilities of a disabled person, first of all his visual analyzer, and the requirements imposed on him by the conditions and nature of employment. Various forms of eye diseases are labelled as to similarity of features into separate categories, for each of them contraindicated and indicated factors of employment having been defined as well as possibility of the use of vision in productive activities. These developments have produced data for creating a "Reference Table", the table being now used by the assessment commission for determining a category of the disease, corresponding type and setting of employment, extent of use of vision in the course of work for each disabled person. Production managers having previously evaluated the conditions of employment and technological equipment of working places, provide jobs to visually impaired persons in compliance with the assessment commission's conclusion.

The given system ensures continuity and uniformity of approach to the problem of disabled people's employment at its different stages in different agencies engaged in these activities, and guarantees rationality of employment of the partially sighted in any medico-social environment.

The introduction of this system in the USSR promotes greatly effective solution of the problem of rational qualitative employment of people with reduced vision on a scientific, medical and engineering basis.

Less severely visually impaired people with visual acuity above 6/60 and a wider visual field are usually employed in regular industry, in various spheres of the national economy where in compliance with the conclusion of the assessment commission or special commissions of medical establishments they are given lightened jobs, often with reduced amount of productive activity. Most low vision persons with higher education work successfully in regular industry, various fields of science and culture regardless of the status of their visual functions.

Dynamic care of partially sighted people's health, annual reassessment by the medical commission and follow-up activities make it possible to introduce corresponding corrections into the organization of labour of the disabled, thus ensuring rationality of their employment. It should be pointed out that social and vocational rehabilitation of people with low vision has been acquiring its most effective forms within the many-sided activities of the Associations of the Blind, the leading of which is the All-Russia Association of the Blind.

The overwhelming majority of low vision persons with impaired working capacity receive a state disability pension and make use of certain advantages.

Problems of daily living have been successfully solved, among them the problem of provision of houses near the place of work. For the benefit of persons with an acute form of visual impairments a great amount of cultural and sports establishments have been set up, social and political publications are being issued.

Low vision citizens are integrated to an increasing extent in all spheres of the public life of the country.

The whole of the work in the field of low vision rehabilitation lies with the state in the USSR. Its practical realization involves participation of medical workers, educators, social workers, psychologists, production managers and others.

Multidisciplinary scientific investigations in the field of low vision rehabilitation are coordinated by a special Scientific Council. The comprehensive low vision rehabilitation system contributes greatly to social integration of people with reduced vision and ensures full social rehabilitation of severely visually impaired people in the USSR.

ABSTRACT

Lindstedt, E. What is Low Vision?

The definition of low vision/visual disability is discussed in relation to different categorizations and to their purposes. Classifications in reference to specific tasks are advisable. Classification systems concerning children and their visual efficiency should be made in terms of visual development, development of other senses, emotions, personality and social behavior. For adults and the old, classification concerns tasks like mobility, activities of daily living, watching television.

The aim of rehabilitation should be to diminish the handicap resulting from a certain visual impairment by optimum utilization of residual vision and adjustment of environment. "We have to work with abilities and not with disabilities". The need of clinical experience is emphasized since the theoretical knowledge is available.

A model of and suggestions on a model for re/-habilitation is outlined.

WHAT IS LOW VISION?

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I Classification of low vision

In 1973 the WHO presented a classification of visual impairment (1). This was extended to comprise also classifications of visual disability and handicap, commented upon by Colenbrander in 1977 (2). It is desirable that everybody presenting samples of visually impaired people should classify according to the WHO standard.

This does not mean that the classification is sufficient as far as habilitation and rehabilitation are concerned. For gross classification and for epidemiological purposes the WHO classification of visual impairment might suffice.

In clinical work the extended classification of Colenbrander (visual disability/handicap) is valuable. In some respects, however, even this might seem insufficient, irrelevant or difficult to apply. It would be wise to accept the principles of this classification and to apply it as far as possible (3). Modification might be needed, and is indeed desirable, as one of the advantages of this classification is its flexibility.

All classifications of visual function are inaccurate because of the complexity of the visual functions and the fact that few functions can be measured and fewer still can be measured precisely.

A Visual impairment should refer to all kinds of dysfunction or defects of the visual system. The WHO definition/classification classifies the visual impairment in categories taking into account only two visual functions (modalities), i.e. distance visual acuity and visual fields, the fields only in cases of severe restriction.

Near vision is a complicated performance, especially when reading is concerned, several different visual (and cerebral) functions being at play, e.g. accomodation, acuity, contrast sensitivity, discrimination ability, perception, cognition. The acuity in the near often does not correlate closely with distance acuity, aberrations have been reported to occur in the normal sighted as well as in persons with low vision.

It is desirable that visual impairment of near vision is recorded in some way or other. The conveniency of different tests and standards ought to be discussed (see below).

Visual fields should be recorded also with reference to other defects in addition to constriction, especially central defects. Standards of recording methods should be discussed and if possible agreed upon.

B Visual disability refers to a reduction compared to the normal of the visual ability/performance.

In practice the significance of the visual disability may vary considerably between different individuals. It would be wise to classify the visual disability with reference to certain specific tasks, recording those of interest for the particular individual. The difference of interest would be evident and would naturally classify the disabled in several groups (e.g. age-groups).

In infance and early childhood tasks of importance would be those promoting visual development, development of other senses, of emotions and personality and of social behavior. Children and youngsters would have paramount interest in being able to communicate, to study, to develop psychological and social independence. The adult would be busy in tasks of significance for the earning of a living as well as for the social and political life. In old age the interest would focus upon the personal independency, to "be able to look for oneself", and to participate in social life by reading and writing.

Classification of disability would thus include reference to specific tasks, for instance mobility, orientation, discerning signs, activities of daily life, television/black-board, reading, writing, performances during work.

The Colenbrander standard classifies the visual disability with reference to different visual tasks, but recommends also a gross classification with reference to the "normal". The divergency from "the normal" in a specific visual task in a definite situation is rather easy to establish. The classification of the total visual performance with reference to a "norm" is extremely difficult. There is considerable difference of opinion about what is "normal" and "abnormal". Such differences would be still more evident when comparing different communities and countries.

C The visual handicap refers to the actual "drawback" of the visual performance experienced by the disabled and/or observed by others in a certain task and in specific circumstances. The aim of rehabilitation and habilitation would be to diminish the handicap resulting from a certain visual impairment by the optimal utilization of the residual vision and by adjustment of the environment. The significance of age is evident also in this work, as in habilitation of children the possibility of active training of the residual vision has been taken into account, as is the possibility of deterioration of vision by improper training. So far the WHO/Colenbrander classification and the possible appliance and modifications.

D The constant reference to the negative divergency of the visually impaired from the "normal" in performance is psychologically and educationally very unsatisfactory. In habilitation and rehabilitation we cannot work with inabilities and disabilities, we have, as a matter of fact, to work with abilities. The interest is then focusing on the residual vision, the practical performance, the visual abilities.

The visual abilities and skills should be measured and classified as well as the visual disabilities. The methods of testing are about the same, the approach only is different. Instead of measuring and telling what the person is unable to perform the record tells about what he is or might be able to do.

This aspect calls for intensified clinical analysis of the visual function. When aiming at the optimal utilization of the visual function, the detailed knowledge of caracteristics of this function becomes a prime interest. Next the interest would fall upon the external conditions, of which the residual vision may be influenced. At last the environmental, psychological and social claims on vision would be considered during the habilitation-rehabilitation.

II Diagnostic methods in assessing residual vision

To improve our knowledge about the visual function we need refined or new methods of measuring the physiological processes of the abnormal eye. Research is called for, but to a great extent problems are already solved or scientific results relevant for our intentions are reported. What is lacking is the clinical exploitation of physiological knowledge. I will give some examples:

a) We all know that visual acuity is an insufficient measure of the total visual function, especially in low vision. The spatial contrast sensitivity may tell us more. There are clinical methods available measuring this function, but they are not used (4).

b) There is evidence that the accomodation in children with low vision is often inaccurate (5). This knowledge is neglected in practice. Simple clinical methods of testing accomodation are lacking.

c) Near vision performance in reading, this extremely important task of the modern society, is very complex and we know at least something about all the different visual functions involved in the "ability" of reading: accomodation, visual acuity, contrast sensitivity, discrimination ability, visual-cerebral perception and cognition. Yet, there is great confusion when testing, recording and reporting the near vision function with the result, that a test record often tells very little about the near vision disability/ability.

We have to organize our knowledge and standardize our testing and recording of near vision in a more precise way (6).

d) Methods of testing and recording the visual fields need modifications to give a better information of the residual vision.

Above the significance of age in classification of visual disability and ability has been stressed. The same considerations are valid also for the testing methods which should be convenient for the individual. For instance, it is quite absurd to test children by reading cards designed for adults.

The significance of the type of eye affection when testing and recording visual function has also to be taken into account.

This actualizes the need of a classification system of aetiology and diagnoses in low vision. It is important to arrive at a system which is simple but yet detailed (7, 8, 9).

III A model of low vision habilitation/rehabilitation

The low vision service of any country has to be formed according to the resources, facilities and traditions of this particular country.

However, it might be possible to agree upon some common principles.

The outstanding importance of the "team" in the habilitation and rehabilitation of the visually disabled is generally accepted. Little may be accomplished without the cooperation of different professional experts contributing knowledge of ophthalmology, physiology of vision, optics, technique, ergonomy, psychology and education.

In the habilitation/rehabilitation of the disabled the work of nonprofessionals is of great importance as well. The cooperation, coordination and communication within teams and between professional teams (e.g. local and regional) and the "home" team (consisting of parents, husband/wife, friends, social workers, teachers) is a very significant part of the habilitation/rehabilitation.

Information, education and reeducation of professionals and nonprofessionals would be a constant demand.

Below my personal suggestion of a model of low vision service is outlined, stressing some points of particular interest.

The organization of a low vision service has the aim to bring knowledge and skill to the disabled in his/her daily life at his/her particular home, working-place or school. This calls for a decentralization of habilitation/rehabilitation.

The habilitation/rehabilitation can only be performed by the assistance of a team of highly qualified experts, able also to participate and exploit research of their respective fields. This calls for centralization of the service.

The need of decentralization of a service which may only be obtained on a centralized level, is a dilemma characteristic of modern visual habilitation/rehabilitation.

There cannot be any perfect solution. By organizing and planning the work, particularly developing methods of cooperation-coordination and communication, much might be accomplished.

Small local teams linked to the local ophthalmological service should be established. The cooperation within the team has to develop.

The habilitation/rehabilitation process might proceed as follows:

The description of visual behavior and experiences of difficulties. The recording of objective tests of visual function. The relation of the experienced visual difficulties with recorded dysfunctions and the interpretation of the visual behavior and experience with reference to the pathophysiological background. Arrival at an understanding of the visual disabilities and residual functions respectively. The suggestion of solutions aiming at the optimal utilization of the residual vision present by aids and technique.

The disabled and the expert member of the team contribute to the complicated habilitation/rehabilitation process on all levels, sometimes more, sometimes less. The cooperation has to become organic, not only operative. The handing over of results from one expert to the other is insufficient. The work has to be done in good cooperation, everybody participating during the whole process, learning from other members of the team and from the disabled person, changing the categories of thinking, exchanging and extending their knowledge.

The local team should develop communication with other local medical departments and rehabilitation centres. The problems of the multiply handicapped should be carefully considered. Close connections should be established with local social and non-professional services for the visually disabled.

The local team should be supported by a regional or central low vision team. Referral of complicated cases should be possible. Discussions concerning individual cases should be freely communicated between teams. Regular postgraduate education should be offered to the members of the local team at intervals.

The regional or central team should be linked to a university eye clinic, equipped with facilities of research and cooperating with other clinics and research institutions of the university.

The habilitation/rehabilitation of the central low vision clinic should be organized to allow subspecialization (habilitation of children, vocational training, rehabilitation of old age, habilitation of the multiply handicapped) and to allow education on different levels.

Close connections should be established with the Handicap Board and with schools for handicapped children, centres of vocational training and rehabilitation centres for old people.

The central low vision clinic should have a library and documentation service.

The development of low vision habilitation/rehabilitation depends upon the clinical exploitation of the advances in physiology, technique and education. The clinical evaluation of methods is of equal importance.

The first step is to choose methods of testing, recording and documentation with great care. It is very difficult to evaluate every single link in such a complex process as habilitation/rehabilitation, influenced as it is by psychological and social factors. Too often a method is considered "good" because it has brought "some" positive results. As pointed out by a wise man, we have to ask ourselves of a clinical or educational method: Compared to what is it good? Compared to nothing? - or compared to anything?

Especially in this previously neglected field we have to be very critical. It is necessary to ask for regular reports and scientific documentation of results in clinical habilitation/rehabilitation.

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ABSTRACT

Nilsson, S.E.
Nilsson, U.L. Low Vision Rehabilitation.

The authors define in a practical way partially sighted and then, for training and assessment purposes, categorize them into seven groups. Assessments of residual vision in different situations are described. The use of normal reading cards for children is not advisable. Cards with much easier text or pictures are used. Central scotomas must always be carefully mapped by perimetry. In this way the proper location on the retina of eccentric viewing can be found.

As optical aids for near vision are used strong monocular hyperoculars or microscopes (16 d - 48 d) in ordinary spectacle frames. Optical aids for distance, visual field expanders, contact lenses are described along with lighting and different methods of training for various purposes.

Finally, the staff of a Low Vision Clinic is described with special emphasis on the low vision teacher.

LOW VISION REHABILITATION

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I What is low vision?

a Definitions

1. Central vision ranging from 0.3 to hand movements. (The lower limit is difficult to define, and each case has to be individually subjected to trial).
2. Visual fields constricted to less than about $10\text{-}15^{o}$, regardless of the central visual acuity.
3. Other impairments of the visual ability (e.g. caused by cerebral damage).
4. A more open definition would be: Those who need low vision training.

b Subgroups of partially sighted relevant for low vision (re-)habilitation

1. Impairment but not loss of central vision, where the patient can be said to "look through a strainer" (e.g. senile macular degeneration).
2. Loss of central vision (e.g. discoid macular degeneration). Eccentric viewing necessary.
3. Concentrically restricted visual fields.
4. Nystagmus.
5. Severe myopia or other refractive errors.
6. Certain retinal degenerations, e.g. cone dystrophies.
7. Certain other impairments of the visual ability, e.g. caused by cerebral damage (hemianopia, difficulties in understanding the text, etc).

II Diagnostic methods in assessing residual vision in different situations

a Distant vision

Careful testing at different distances from 5 m to 1 m using different charts with several optotypes for each line or using projectors with several alternatives.

Even better is the use of a projector by which much larger optotypes can be projected on to a large screen which is view at a distance of 5 m. For small children the Snellen E or pictures are used.

b Near vision

Testing at normal reading distances with "normal" addition when possible. Testing at shorter distances with stronger addition. The usual reading cards are generally to difficult for old patients and children (constituting a large group at a low vision clinic). Cards with much easier text are of great importance. For small children different pictures can be used.

Measurements of reading speed can be done using an ordinary book with easy text. "Low vision training" (1979) by Bäckman and Inde also provides a good alternative, but the text is sometimes too difficult for older patients. Testing the patient on the kind of text he/she is used to read (daily papers, magazines) also gives valuable information. The kind of text used, the distance and the optical correction should be recorded.

c The visual field

We find it most important that perimetry be performed not only as to the peripheral field (retinitis pigmentosa) but also with respect to the central area, where central scotomas must be carefully mapped, using the special central scotoma apparatus for the perimeter. This greatly facilitates proper location of eccentric fixation for rehabilitation of reading ability.

In many cases particularly as to children, diagnosis and prognosis can be assessed with greater precision by using electrophysiological tests (electroretinography, electrooculography, visually evoked potentials), dark adaptation tests and spatial frequency tests.

III Prescription of optical aids

a Optical aids for reading

1. When reasonable magnification is sufficient and binocular vision can be used: Increasing addition, often in combination with prisms.
2. Simple hand magnifying-glass for reading price-

tags, head-lines etc. Of particular interest for very old patients, who cannot learn to use an advanced aid.

3. Magnifier (about 2x) with a ring-shaped fluorescent tube and adjustable "desk-lamp" holder.
4. For most patients it is necessary with stronger magnification and monocular reading, however. In these cases hyperocular or microscopic lenses (16-48 diopters) in ordinary spectacle frames are used. This is a very common aid at our Low vision clinic. In our experience visolettes and stand readers of similar types are of only limited value.
5. When even higher magnification is required a stand magnifying system with built-in illumination (e.g. a Keeler system, up to 20x) may be used.
6. Closed-circuit TV system for reading, writing, in the school situation and at different kinds of working places, 20-40x.

b Optical aids for distant vision

Monocular or binocular light-weight telescopes, hand-held or mounted in spectacle frames. Some of them are adjustable from far distance to about 1 m or even shorter distances.

c Optical aids for intermediate distances (15-30 cm)

Non-focusable telescopes (e.g. Keller, Zeiss (West)) mounted in spectacle frames (monocular) are valuable for reading off instruments, for hand-work, when filling an insulin syringe etc.

d Visual field expanders

Minute, reversed Galilei telescope, e.g. for retinitis pigmentosa.

e For certain patients contact lenses, alone or in combination with other aids (e.g. in aphakia, severe myopia), and glasses or contact lenses with reduced transmission of light (e.g. in albinism, cone dystrophies) may be of great value.

f Additional aids

such as lighting and reading tables are of great importance to obtain full benefit of the optical aids.

IV Methods for training of residual vision

(subheadings corresponding to those of section III)

a Reading

1. When high addition is used and the reading distance is less than about 15 cm, good stability of the read material (book, paper) is important. Training of elbow support.
2. Hand magnifying-glass requires very little instruction, concerning mainly the proper distances.
3. The "desk-lamp" magnifier is more difficult to use for old patients than one would believe. Training includes correct distances and holding of the text parallel to the magnifier.
4. In order to obtain full benefit (or in most cases to obtain any benefit) of the hyperoculars and microscopic lenses with very high power (16-48 diopters) and extremely short reading distances (6-2 cm), an intense and advanced training is absolutely necessary. These aids are used mainly for patients with total loss of central vision. Training by a well educated and skilled low vision teacher includes a) text support (elbow fixation, reading table,

manuscript holder), b) correct distance, c) correct movement of the text, d) eccentric viewing, e) saccadic movements of the head in nystagmus, f) proper use of illumination. Very few, if any at all, can learn eccentric viewing by themselves. The large group of patients with advanced macular degeneration, (loss of central vision) was earlier left mainly without help (or with strong optical aids, that were put in the drawer within a week because the patient could not learn to use them). Training of this group of patients according to modern principles is a most rewarding job.

5. Training with a strong magnifying system with built-in illumination (e.g. Keeler system) concerns mainly the correct way of following the lines.
6. The TV system requires training in the proper way of moving the text and often training in eccentric viewing. The TV system also allows writing, filling in different forms (for the bank, the post office etc). Training is difficult in the beginning but very rewarding.

b Distant vision

Training concerns focusing the telescope at different distances with the telescope (-s) hand-hold as well as in a frame. This is done through the window, at the black-board, at pictures and at the slide screen.

c Intermediate distances

Learning to focus at the correct distance.

d The visual field expander

Walking with the patient in the traffic, teaching her/him to use the reversed Galilei telescope when crossing the street etc.

In many cases the initial training at the low vision clinic has to be followed up by visiting the home of the patient, the place of work, the school (always) for instructions and for information to relatives, foremen and teachers. The low vision teacher also has to give advice as to the correct arrangement of the place of work and the lecture room (e.g. illumination, TV system).

The low vision teacher plays a key role in the team at the low vision clinic, co-ordinating the work within in the team and being the link between the patient and the place of work, school, social authorities etc. Many of the principles concerning the choice and training with optical aids were earlier emphasized by Ö. Bäckman and K. Inde in their book 'Low vision training', Hermods, Malmö 1978.

V Effects of low vision rehabilitation on living conditions

The benefits of modern low vision (re-)habilitation are tremendous. Very few patients in ophthalmology are as happy and grateful as those given back the ability to read and to write, often after a life in "blindness" for a long period of time. They were often totally dependent on relatives or other persons, they could not handle their bank affairs, they had not seen their grand-children, the new prime minister etc. These persons may live an entirely different life after rehabilitation, to a large extent independent of help of other persons. Patients in the working ages may often be able to go back to work after being given proper aids, training, and re-arrangement of their place of work.

For children rehabilitation in a large number of cases means that they are able to attend a normal class at school, together with seeing children and at their home school. This is most important not only for their education but also for an easier adjustment to life and work after finishing school.

Experience in Sweden of low vision rehabilitation during the last decade has been most beneficial, encouraging and rewarding.

VI A model for low vision rehabilitation

After a start at a few centers for re-education and general rehabilitation of workers low vision rehabilitation in Sweden is now being built up at low vision clinics in every county.

The low vision clinic - in our opinion - should be part of or very closely connected to an eye clinic (department of ophthalmology), which is natural and also necessary for providing medical knowledge and experience as well as ophthalmological examinations.

The staff should consist of:

a A part-time ophthalmologist, experienced and with training in low vision rehabilitation.

b Low vision teachers (visual therapists), one per 100.000 inhabitants. The duties of the low vision teacher are:

1. Participation in discussions together with the ophthalmologist, the optician and other members of the team concerning the diagnosis, the prognosis and a preliminary (re-)habilitation program for each patient.
2. Assessment of social and behavioral factors.
3. Informing the patient and his relatives as to the nature of his disease.
4. Motivating the patient for the (re-)habilitation program and giving psychological advice.
5. Teaching the patient to develop his residual vision by training him to use certain techniques (e.g. eccentric viewing) and by training him to use properly and to make the most of his optical and electron-optical aids and accessories.
6. Providing information and advice as to the design and illumination of places of work for

visually handicapped in industry, at offices, at school and at home.

7. Co-ordinating the activities at the low vision unit.
8. Taking the necessary contacts with school, authorities, teachers, the pre-school counsellor, the itinerant teacher, the social counsellor for the visually handicapped, the vocational rehabilitation authorities, and the different rehabilitation courses for visually handicapped.
9. Making the patient aware of the different aids for daily living skills.

To fulfil all these duties it is necessary that the low vision teacher is properly trained. The profession is mainly educational. Of the different tasks mentioned above, No 5 is generally the most time-consuming one. Teaching a patient eccentric viewing in combination with reading with very strong positive lenses is a qualified educational job. Thus educational psychology and methodology of low vision (re-)habilitation are emphasized in the one-year long training at the university level of low vision teachers. Furthermore courses in ophthalmology, optics and general psychology etc are also included.

The main admission requirements are:

1. Examination from either a school of education, a school for occupational therapists, a school of nursing or a school for ophthalmic assistants (ophthalmic technicians).
2. At least three years of experience as a teacher, an occupational therapist, a registered nurse (at least two years at an eye clinic) or as an ophthalmic assistant.
3. Experience of work among visually handicapped is considered as particularly qualifying.

c Ophthalmic optician and contact lens technician for trying and fitting optical aids. It is of great importance that the opticians working at a low vision clinic are well educated also as to the function of the diseased eye. The appropriate optical aid for each individual patient is discussed and decided upon by the ophthalmologist, the ophthalmic optician and the low vision teacher together as a team.

d Mobility and rehabilitation instructor and occupational therapist.

Since we have special rehabilitation courses, shorter and longer, and hopefully in greater number in the future, we do not always need full-time instructors and therapists at the low vision clinic. When a good collaboration is established these persons may be shared between the low vision clinic and the rehabilitation clinic and the rehabilitation courses. The mobility instructor and the occupational therapist also take care of the ADL training and participate in arranging the home for visually handicapped.

e A part-time social councellor (collaboration with a rehabilitation clinic) provides valuable help as to contacts with social authorities etc.

f Secretarial help is indispensable.

We find it most important that the persons working with the visually handicapped come to see the patients at the low vision clinic. This is true also for the part-time members of the team. The low vision teacher can take care of a number of steps and measures traditionally handled by occupational therapists and social counsellors, and it is often of value for the patient that he is not 'rotated' among too many individuals.

Modern low vision rehabilitation is rather young in Sweden, but we have now clearly seen the unbelievable rehabilitation results that can be achieved. It is urgent that low vision clinics be built up not only in the industrialized world but also in the developing countries.

VII Research

Whereas the function of the normal eye is rather well known, the function of the diseased eye is still to a large extent unknown. What is the difference between the macula and the extramacular region as to retinal responses to light? Which is the best way of stimulating the retina in the extramacular region? It is urgent that biomedical research, basic and applied, is initiated and supported as a basis for educational progress within this field.

ABSTRACT

Silver, J. Low Vision in the United Kingdom.

520 of 100.000 inhabitants in the UK is estimated to be visually handicapped, 75 % of them over 65 years of age. 104 centres of which 27 are hospitals with low vision clinics, provide service, that varies enormously. The service is given free of charge within the National Health Service System. The optical aids are given to the patient "on loan". It is impossible to meet every contingency from one manufacturer. Therefore alternative of every type of aid should be available.

The advantages and disadvantages with different types of aids are described. The aids are divided after function for

- distant vision (i.e. telescopes)
- near vision (i.e. spectacle magnifiers)

The patients are classified into

- children in fulltime education (16 %)
- employment and vocational problems (40 %)
- elderly persons (50 %)

The assessment and follow-up are important ingredients in a Low Vision Program. Before the low vision assessment a comprehensive investigation has been made by an ophthalmologist.

Special interest is given to partially sighted children, and the matter of training.

LOW VISION IN THE UNITED KINGDOM

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The most recent figures available for England and Wales give around 120.000 registrations as 'blind' (defined as "unable to do any work for which eyesight is essential or less than 3/60") and about 40.000 'partially sighted ("substantially ..... handicapped ..... by defective vision ..... 6/24 or less"). These figures i.e. approximately 270 in 100.000 are known to be a considerable under estimate, recent research (Culliman, 1977) shows that the true figure is likely to be close to 520:100.000; i.e. only half of the visually disabled are recognized by the Social Services. The remainder are either not aware that they are eligible or are so overwhelmed by other problems that their visual disability is relatively unimportant. Most, that is 75 %, are over 65 years of age.

Under the National Health Service all treatment is completely free, although a contribution is required in most cases towards drugs and appliances. Normally persons who have problems with vision first seek help from a local ophthalmic optician (optometrist) or ophthalmic medical practitioners. If vision does not improve to normal level with ordinary spectacles he must be referred through the General Practitioner to an ophthalmologist working in the Hopital Eye Service. The ophthalmologist in turn will investigate fully in case a medical or surgical solution to the problem is available. Where it is not or there is a residual visual deficiency the patient may be referred to the low vision clinic.

Theoretically, low vision services are available throughout the country. In 1977 a survey (Silver and Thomsitt) showed that there were 104 centres where low vision aids could be obtained. These varied enormously; in many cases patients are referred to private opticians' premises which are staffed by dispensing opticians who charge the hospital on a capitation basis. Some practitioners have limited experience and only a small range of aids at their disposal, others are excellent and well equipped, but at its best this system precludes good follow-up and many aids are discarded, due to lack of clear instructions on use, advice on illumination appropriate to the eye disease or deteriorating vision. Certain opticians attend local hospitals on a similar basis. Twenty-seven hospitals have low vision clinics, directly staffed by hospital personnel - usually optometrists. Of these the largest is the clinic at Moorfields Eye Hospital where up to 500 patients are seen every month for low vision assessment or follow-up. It is on the writer's experience in developing and running that clinic that this paper is based.

The department holds an example of every type of aid available in Great Britain and many that are not. We work entirely within the National Health Service although private patients are seen at my own consulting rooms. It is, therefore, as a clinician working in a hospital environment that our methods are presented to you.

Through the National Health Service low vision aids are prescribed at the request of an ophthalmologist. Treatment is completely free and all aids are given to patients 'on loan'. In practice this means that by the time a patient attends the low vision clinic a complete ophthalmological investigation is available, including fields, electro-diagnostic investigations, etc, where necessary. Also, of course, a family and medical history along with information on present and planned treatment. This information gives the low vision practitioner some insight into how the patient perceives his environment and the prognosis for preservation of vision, both long and short term.

Effective prescribing for the low vision patient is dependant upon the availability of a comprehensive range of aids. Several manufacturers, notably 'Designs for Vision', in New York, using methods advocated by Dr William Feinbloom, or the intelligent and flexible system devised by Charles Keeler in London, and marketed under his name, have produced 'fitting sets' that cover many functions, but while every practitioner develops preferences for certain aids these should never be allowed to become prejudices. Alternatives of every type of aid should be available as it is impossible to meet every contingency from one manufacturers products.

Aids are classified in many ways - but we will consider them only in terms of function in the clinical context.

Every type of aid, indeed every aid, has different characteristics, both advantages and disadvantages, and ultimately the function of the practitioner is to use his expertise to select the aid with fewest disadvantages for this specific patient's requirements. A sound knowledge of the underlying scientific principle is an essential prerequisite and these are described well in the literature (Mehr and Freid, 1976). Here we will content ourselves with a brief description of each type:

For distance vision, that is from 1 metre to infinity, only telescopic systems are in normal use. These can be either galilean, or terrestrial with a prism to present an upright image. The major disadvantages of telescopes are that they:
1. reduce field
2. are very heavy
3. have a bizarre appearance
4. disrupt normal spatial relationships

and 5. are expensive.

Small low powered telescopes can be mounted on spectacle frames - several different types are available. Simple binocular sports-specs. are mass produced with adjustable inter-pupillary distances and individual focusing - magnification up to about 3x. Several manufacturers (Zeiss, Keelers, Designs for vision, Hamblin, Stigmat, etc) produce monocular or binocular telescopes which can incorporate a correction. These can sometimes be mounted high on a lens to allow vision below - the head is dropped slightly to allow vision 'along the tubes' - these are called 'bi-optic telescopes' - magnification is again no more than 3x and have obvious applications in the classroom. Certain States in America allow visually disabled people to drive using such appliances. Similar telescopes are placed centrally on the carrier lens and also have convex 'cap' lenses of varying power which can be added to reduce the focal length for near vision. Small hand held monocular or binocular telescopes can also be used for a wide range of purposes. For most patients the maximum is around 8x. A few telescopes will clip onto or suspend from spectacles, thus producing the best of both worlds, but they are monocular and only up to 4x.

For near vision there are many alternatives. Simple hand magnifiers are available in enormous variety. I have about 50 alternatives in my own clinic, each slightly different. Next we should consider stand magnifiers, often grouped with hand mags, in fact, they meet different needs. For both types integral illumination is often an advantage. Stand mags are often very bulky and both have a relatively small field unless the patient can be persuaded to use the appliance close to the eye. Theoretically magnifiers should be used with a distance correction. In practise the patient will often prefer to wear a normal reading correction.

Spectacle magnifiers are excellent cosmetically and have a relatively good field. Several manufacturers produce then in 'bifocal' form which is frequently an advantage. Disadvantages are the short working distance in higher powers and the inevitable decision to abandon binocular vision for some high powered aids. Spectacle magnifiers are usually single lenses, although sometimes two or more lenses in combination are used. Problems also arise with description which is often in terms of magnification. A 5x lens is 20 dioptres, therefore for the aphake it may only give 2x effectively or for a -12 myope 8x. Near vision telescopes are the only optical appliance that can allow manipulative skills such as writing, or sewing to be sustained. The same disadvantages apply to near as distance vision telescopes that, in that they are often used for longer periods, to neglect refractive errors more often results in discomfort. Near vision telescopes at the time of writing are available up to 5x binocularly and about 10x monocularly.

In the last decade electronic aids utilising closed circuit television techniques have become widely available. They permit far higher levels of magnification than have previously been available (200x is available on a new machine), allow image reversal, that is white print on a black background, and a normal reading position with the distance from the screen selected by the subject. Such aids allow enormous flexibility particularly when a zoom lens is incorporated as a wide range of magnification is available my making a simple adjustment. Disadvantages are the cost, currently around £1.000 and its bulk - it is transportable rather than portable.

I have found in my experience only 2 or 3 patients who derived benefit from pinholes, but masking devices such as the Prentice Typoscope, large print and reading stands all have their place in the low vision clinic.

The subject of the hardware cannot be left without mention of illumination. Every practitioner needs to be familiar with the principles and be equipped with flexible lighting in order to be able to provide optimum conditions for individual patients and advise them accordingly.

Patients should be seen in the low vision clinic when they wish to perform tasks that they cannot manage with normal correction. The only exception to this rule is children with a congenital disability (see below).

We tent to classify patients into three main groups:

1. Children who are in full time education who make about 4 % of those registered blind (but about 10 % of our own clinical load).
2. The employment and vocational problems - about 25 % of those registered.
3. The elderly who are 75 % of the registered and half of our clinical load.

Low Vision Assessment

Let us first of all consider the adults and the elderly. Children demand a completely different approach and will be discussed separately. The most important part of the procedure is the full elucidation of the patient's problems. He must be encouraged to describe his problems as accurately and as specifically as possible and put them into order of priority. This process is beset with traps for the unwary practitioner. Firstly the patient comes to the clinic in a very complex psychological state. He has usually been told that he is 'blind', and has attempted to adjust to this by abandoning all ambitions to acquire information visually. Such patients will state very modest aims: "to read my bank statement and letters" is very common, but close questioning will reveal far more. Another patient presents a wide range of diffuse problems, "I want to see better" and it becomes evident that what is being sought is an overall improvement, that is a cure for his eye condition, rather than the means to cope with his disability. In both cases the true situation must be confronted and the function of the clinic explained and understood.

Patients are encouraged to bring examples of 'problem materials' with them to the clinic, along with any aids prescribed, purchased or improvised. It is important to create a sympathetic environment as without fear of disapproval or ridicule patients will disclose their own unconventional solutions. These may include wearing two or more pairs of glasses or convex lenses 'borrowed' from other devices. Acuities should be recorded with all pre-existing spectacles and aids. This provides invaluable information about the motivation and adaptability of the patient.

The patient should be refracted carefully. A chart placed at 3 metres should be used if the visual acuity is less than 6/60, the half-dioptre error in the sphere thereby introduced can be either included in calculations or for near vision may be ignored - it will merely make a small difference in the final working distance. The near vision acuity should be checked with a +4 addition at 25 cm. This provides a confirmation of optimum distance correction if the relationship between near and distance acuities is well understood. This basic near acuity provides a starting point for assessing the magnification level that is likely to be required. Here it is an advantage to use the 'N' chart recommended by the Institute of Ophthalmology, where there is a direct arithmetic relationship between the print sizes. It is at this point that the advantages of a precise definition of the first priority problem becomes apparent. Most patients request help with reading, but for one patient it will be reading the instructions on a kitchen packet, for another reading notes at meeting and masses of letters, for a third checking printers proofs for publications.

Assuming disability of similar aetiology and distance acuity of about 6/60 (N24 with a +4.00 add) magnification of about 5x would be indicated. In the first example a simple hand magnifier would apparently provide an adequate solution, the second suggests a spectacle magnifier, probably in bifocal form, the third demands a telescope to make the necessary editorial marks. This sort of thinking should prevent the practitioner from tiring the patient and wasting his own time with a long series of inappropriate aids. In the Moorfields clinic it is standard practise to etablish magnification requirements with high plus addition up to 20 dioptres, which is equivalent to 5x and, while concentrating on the type of aid indicated by the patient's originally defined problems, ensure that at least one aid of the alternative types is demonstrated. If the patient has low expectations the possibilities revealed to him may encourage him at that point to revise his requests. The patient's response to the appliance should be noted - the correct aid is the most acceptable one, at least at the first visit, but broadly telescopes are indicated where there is a manipulative task or a long range required, spectacle microscopes where cosmetic considerations are important and a monocular aid is acceptable, stand magnifiers where grip is impaired or the patient cannot find the correct lens position, and hand magnifier for infrequent use or as an 'extra' aid for shopping etc. When ever possible patients prefer binocular vision. Most patients attend the clinic with an escort and it is of benefit to involve this person towards the end of the assessment, both to confirm that the desired level has indeed been reached and to reinforce the message of illumination and range. There may be a delay in the supply of prescription aids and when collecting, acuities should be verified and illumination and range instruction given.

Very few patients can absorb too many changes into their way of life at one time. Therefore, it is wise to supply the aid that appears to meet the first priority need and allow that aid to be absorbed into the patient's way of life before introducing other appliances to meet other needs. Which brings us to follow up.

The importance of follow up cannot be exaggerated. Even the most experienced practitioner may not prescribe the ideal appliance at the first visit. Indeed many patients reject the 'ideal' appliance, particularly if it is a complex custom-made aid. Such a rejection is probably multi-factorial, but changes in attitudes and skill will have taken place by first follow up and a sophisticated aid may then be accepted. Many patients with progressive disease or active disease that will ultimately stabilize, are seen. Such patients should either be given a series of simple magnifiers until stability is reached, or aids such as the Stigmat telescope which, by the addition of alternative caps, can be modified in the light of changed circumstances.

Normally follow up takes place three months after any aid is supplied and when the management is stabilized at yearly intervals. Patients often use a number of aids for different purposes - for example, a personnel manager will use a hand held monocular to enable him to select the correct bus to get into work, a spectacle microscope to interview his new staff, a hand magnifier in the super-market on his way home, and a face mounted telescope to watch his favourite television programme after dinner. Few patients actually use this number of aids, but it is not unknown.

Partially sighted children require a very different approach. The vast majority will have a congenital condition - most commonly cataracts, optic atrophy, albinism, etc. Many have eye conditions that have associated abnormalities such as deafness, spina bifida, etc. Children with a congenital disability may simply be unaware of what they are missing. After all they have no basis for comparison. Apart from some of the aphakes and those with a severe visual disability these children normally have no difficulty learning to read. Early school books are printed large (at least N18) and well spaced.

We find that the children with acuity of 6/18 to about 4/60 present at the clinic at seven or eight years or age, that is when they start to do a lot of blackboard work, but distance aids are often loaned on a speculative basis so that the child can explore their possibilities. Children accept miniature monoculars and binoculars very readily in most cases, and return for follow-up eager to tell us of exciting new activities possible with the aid. The one that we always quote is the small girl who rushed in and told us "I've seen a real bird on a real tree" - apparently while very interested in wild-life she had never been able to get close enough to a live bird to observe it, so her interest had been limited to pictures and stuffed birds in museums. There are many similar anecdotes. Some children are reported by their parents to have used the aids very little after the first week or two. In these cases we recover the aid until the child requests "another try" - this tends to happen when there is something he really wants to see, perhaps a football match, rather than something someone else thinks he ought to want to see like a blackboard. Young children sometimes have not developed the manipulative ability necessary to find the object of regard and focus upon it. These children are seen regularly for follow up and we intervene at the appropriate moment.

Aids for near vision are supplied on a speculative basis too, when we feel that the child might benefit. Education is about a good deal more than merely learning to read. Problems often occur with maps, mathematical tables and even examining plants or insects. We find greatest acceptance of small stand magnifiers and the solid flat field type (Visolett loupes). The child will move on to face mounted appliances later. Aphakes, of course, cannot accommodate to achieve good near vision and therefore need face mounted appliances relatively early. The developmental paediatricians have become interested in our work and feel we should see children quite early - these days we start to see them at about four both to establish a relationship and to fit any acceptable aids. The aim with all the children is, in every sense, to widen their horizons.

The incidence of partially sighted children with other disabilities is high and increasing. Such children present enormous problems for those responsible for their education. Should they be educated as partially sighted, or deaf, or perhaps physically handicapped? It has been found that we can simplify such decisions by obviating the need for special visual materials. When we looked at all the children attending the clinic during a given period we found that more than half the children we were seeing were in normal schools and apparently keeping up with the peer group. (Gould and Silver, 1974). It has been found that such children tend to be of above average intelligence with supportive parents, good acceptance of low vision aids, and the confidence to be 'different'. (Parlett, Jamieson and Pockington, 1972).

We have noticed that during adolescence, there is sometimes a complete or partial rejection of aids. Possibly this could be helped by some form of counselling, but our current strategy is to adopt a relaxed attitude and suggest that aids are only used privately. The phase passes. It was all summed up very neatly for us by one young man who had been educated at a single sex school and found himself embarrassed in mixed company at college: for a time he tried to manage concealing his disability but then told us "I decided I preferred people to know I had partial sight, than think I had partial brain". A position ultimately reached by most of our patients.

Training

Apart from instructions from the clinical staff when an aid is supplied no training in the use of aids is given. We are as yet unconvinced of the benefits of training when the correct appliance has been prescribed. A small controlled trial was equivocal.

Published figures for proportions of patients in different clinics considered 'successful' do not appear to vary according to the training given, rather according to how 'successful' is defined. Our own working definition is "when one or more of the original presenting problems are solved to the patient's satisfaction". We reject any definitions based on clinic performance. At present patients are shown how to use the aid, instructed on eccentric fixation when indicated, illumination, reading stands and so on, and no further action is taken until follow up. We feel that the 'problem solving' approach detailed above provides the most acceptable aid and training would provide only marginal improvement. A member of the department is at present conducting a study on the effects of instruction as against training in matched patients.

So far we have discussed the hardware, the patient's attitudes, clinical techniques and follow up. But a comment needs to be made on the qualities of the practitioner. He, or as seems to occur increasingly frequently she, must present well to the patient. Mere technical and clinical competence is not enough. It is important to appear confident and enthusiastic which must be distinguished from brashness. Sensitivity and some insight into how the patient feels is essential, so is the ability to listen to confused or incoherent patients and sort out what is relevant. A low vision practitioner needs an understanding of basic psychological processes, but particularly those associated with bereavement (loss of sight is undoubtedly just that), stigma and most important motivation. Understanding of the dynamics of the clinical interview and interpersonal transactions can be invaluable too. The patient does not need sympathy, he needs constructive advice - "we cannot help you but we can give you the means to help yourself" is the way we often express it. The practitioner needs a good working with relationships with others involved in rehabilitation - social workers, mobility teachers, educationalists, technical officers etc, and close interaction with the ophthalmologist responsible overall. Patients using low vision aids will often use non-visual methods for some things and the sort of arrangement where information can be given informally (and fast) by telephone can be greatly to the advantage of all concerned.

The low vision practitioner will find his work enormously rewarding and great fun. Attitudes to disability will, we hope, continue to change, the low vision practitioner can help by giving the 'blind' the ability to cope with normal materials in a normal environment.

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ABSTRACT

Skydsgaard, H. Low Vision Clinic Service - an Important Element in the Social Rehabilitation.

Even small improvement of vision could be of vital importance for the visually handicapped. Except for a few pathological conditions utilization of even very low vision is not dangerous. It is not contraindicated to exploit to a maximum whatever vision exists. The sight saving principle has long been history.

Different age groups have special needs and require special measures taken. Many children have been taught Braille unnecessarily. There are "border line" cases that demand careful medical - - educational consideration.

Young adults are among the best candidates for low vision aids. Low vision aids have increased the old person's independence.

Optical aid services should be considered equal to services already available to other groups of handicapped.

A big variety of optical aids and a fully equipped optical workshop are essential ingredients for low vision services.

LOW VISION CLINIC SERVICE - AN IMPORTANT ELEMENT IN THE SOCIAL REHABILITATION

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The question of visual aid in low vision is a versatile subject involving a lot of problems of different kinds: Technology, psychological and physical optics, methods of investigation, ocular pathology, psychology, education, vocational training, rehabilitation, and add to this questions of human, social and economic nature.

The provision of special optical aids for partially sighted persons is not new. Magnifiers, strong plus lenses and telescopes of different kinds have been used in the past, but the prescription of such devices was not earlier an essential concern of the ophthalmologists, and knowledge on these topics was not a basic subject in ophthalmological education. In the past two decades, however, there have been considerable developments in this area, and the question is to-day of highly current interest to different professional disciplines. Even small improvements of vision could be of vital importance for the visually handicapped, classified as blind. We know that except for a few pathological conditions the utilization even in very low vision is not dangerous or detrimental to the priceless residual vision which many disabled persons quite reasonably still believe. Actually it is not considered contraindicated to exploit to a maximum whatever vision exists. The sight saving principle has long been past history. This point of view is fundamental when dealing with optical aid for visually disabled persons, and is moreover important for all measures taken in order to stimulate poor vision, improving the visual efficiency. The significant results so far of visual rehabilitation by high power unconventional optics, particularly for reading, have greatly surpassed previous expectations and mean a virtual revolution. In addition to this comes the most recent developments, the optiscopes, the electronic magnifiers, the closed circuit television device (CCTV), and fiber optics. The question has indeed become a challenge to the ophthalmologic and allied professions and to the society as a whole. This optic restoration of low vision has become an essential link in the education and rehabilitation of the visually handicapped in all ages. No low vision patient should any longer be written off as hopeless until a careful trial with special optical and allied aids has proved useless. It should be remembered that print is still the best access to seeing world. The low vision persons fall readily in three categories:

1. children and adolescents at school
2. patients in active employment, the industrial age classes
3. the old-age classes, the elderly people

These categories have each their special optical needs and require different measures taken.

In the first group optical aids have given very gratifying results. Remarkable improvement of reading ability with a favourable influence on the education and the child's general proficiency is evident. In many cases it is possible to keep a child with even extremely poor sight in normal school classes at the level of his own peer groups so that he can match with them educationally, socially and vocationally. Furthermore the optical aids have enabled transfer from Braille classes to classes for the partially sighted, reading print. No doubt many people in the past have been taught Braille unnecessarily - an important feature in this connection. To-day we can benefit from the mistakes in the past. It is now widely held that any person who is able to read type - even a patient with a vision acuity of 1-2/60 - should generally not be adviced to read Braille in school unless a bad visual prognosis is imminent. Among the so-called border-liners the optical aids may in some cases just change partial blindness to partial sightedness. Such border-liners are well-known in all schools for the blind and partially sighted, and call for careful medical-educational consideration.

The second category includes the persons in their active and productive years, a "youthful" group as compared with the average low vision patient. Their problems on educational placement and employment can be crucial, and psychological troubles are not uncommon. The restoration of reading, definitely the primary visual need, is of paramount importance. The use of optical aids may enable the visually handicapped to maintain employment and possibly continue in their usual job, rendered difficult by a more recent or slowly increasing loss of vision. This is true when the task requires prolonged reading, but it also applies when only occasional short term reading is demanded. Young adults starting on their vocational training can be helped to pursue a vocation of choice. It should be noted that a fixed obligatory working distance of about 40 cm may render difficult the supply of rational aids. An exact knowledge of the specific working difficulties of the individual and an analysis of the special visual needs required is essential to place or replace the man on his best road of career. Young adults are among the best candidates for low vision aids.

The old-age category (age of retirements) is by far the largest group in the low vision clientel. The patient's age itself has no bearing upon his chances for visual restoration. Complaints of all sorts of discomfort: tiredness, depression, senile asthenia, and physical functional loss may be more relevant obstacles to unsuccessful results than is the impaired vision itself. In such cases the investigators (doctor, optometrist) should not be too eager to obtain successful results. Nevertheless in many cases the provision of optical aids for near vision, particularly for reading, has relieved the old persons' feeling of loneliness and isolation and increased their personal independence. It is often surprising how old people can drop rigid habits and adopt new reading conditions. The individual need for reading differ considerably. The patient's requirements are the essential criteria. Any aid is considered successful that works from the patient's point of view.

Unquestionably the low vision care has become an urgent problem in social medicine. An optimal aid service should be considered equal to the services already available to other categories of handicapped persons. This service should be able to meet the particular demands of each person in the groups mentioned. Realizing this an increasing number of low vision clinics are being established in the USA and on the continent during the last two decades.

The prescription of visual aids should in all cases of low vision be preceded by a thorough ophthalmological investigation. The visual test procedure of poor vision patients varies. The use of ordinary Snellen charts has to be modified as each chart has too few letters in the critical range of 2/60 to 6/36. Some authors have introduced test procedures at short distances and consider the near acuity more relevant in assessment of the magnification, the basic principle of low vision restoration. It should be remembered that the normal comparability between near vision and far vision cannot be verified in many low vision patients because of the character of ocular lesions. Regardless of the methods adapted each patient calls for individual consideration. An exact diagnosis is important because the benefit of the various aids depends not least on the nature and the extension of the eye diseases. It is generally agreed that successful results are obtained in case of depression of the macular function. The central retinal lesions are one of the most important diagnostic entities in the gerontologic groups of the low vision patients. Fortunately a large percentage of the other actual eye diseases also respond to optical aids. Marked field defects mean most severe limitation and are recorded as unfavourable cases (degeneration of the retina, retrolental fibroplasia, advanced glaucoma, atrophy of optic nerve).

Vascular lesions of the retina - especially diabetic retinopathy - are also considered doubtful.

Many uncomplicated low vision patients can no doubt be served properly in private office practice without disorganizing scheduled time too much. The ophthalmic practitioner must, however, be prepared for a long visit. The occasionally tedious task presupposes of course professional knowledge on these topics and a positive attitude towards this extension of the ordinary ophthalmic routine. Collaboration with skilled opticians is a matter of course.

As emphasized above the low vision problems, however, involve a lot of non visual, particularly psychological, factors. If the practitioner feels that he cannot cope with these matters he should refer to a centralized institution with better liaison to other experts and helpful agencies.

The setting up of a low vision clinic (low vision center, optical aid clinic) is approached in different ways, depending on available social facilities and community resources on the location chosen for a center. In the USA institutions for the blind have established optical centers as an additional facet in their rehabilitation program. In some countries the low vision clinic is associated with an existing eye department (regional, governmental). In Denmark the optical aid service is integrated in the eye department associated with the National institute for the blind and partially sighted. This system is found useful and expedient. An optical aid clinic should have at its disposal a rich assortment of optical aids for all visual purposes. A fully equipped optical workshop should also be at hand. An extended contact lens service is indispensable. The beneficial effect of contact lenses for keratoconus and irregular astigmatism due to corneal scars, as also for high myopia and aphakia, is well known, The medical and technical problems concern primarily ophthalmologists and opticians. It is, however, not only a question of fitting and dispensing the best possible aids. There still remains an important task: to teach the patient to use given devices, to explain their limitations and the new conditions for near vision: monocularity, close working distances, illumination problems etc. The acceptance of low vision aids not least depends on the attitude of the examiner. Encouragement and mental stimulation of any kind are indeed a very important therapeutic supplement which should be strongly supported by friends and by the family. Several visits in the clinic may be needed. A close follow-up should be organized to support a patient, to evaluate the usefulness of the optical aid, and to make necessary adjustments. Possibly the visual status is decreasing or the visual demands may have changed.

A discouraged patient may have rejected the aid. In some cases the aid is given as a loan. A current home service for help and control is considered highly relevant and most valuable.

The final object of a visual aid service is to enable the patient to perform at his maximal potential at all times. To fulfil this aim the clinic requires close co-operation with educators, rehabilitation counsellors, social workers, psychologists, family members etc. A fully capable center constitutes an interdisciplinary team involving allied disciplines, qualified to offer a wide range of professional services.

Experiences from these clinics will provide important material for evaluation and research. Resident service in these places is considered essential in postgraduate education in ophthalmology.

The organization of low vision clinics is an urgent social mission. The number of visually disabled people referred to these centers is supposed to increase in the future. In our time the dominating causes of blindness in children and youth are due to hereditary and congenital eye conditions. These lesions bring about partial sight more frequently than true blindness. As a consequence of the prolonged average life time the incidence of visual impairment in the old-age classes is also increasing. These facts should be kept in mind in the future low vision care.

ABSTRACT

Tobin, M. The Assessment and Development of Visual Perception for Educational Purposes.

Methods of assessing and training visual perceptual abilities have been developed for children to be used in a classroom situation. The procedure was designed so that the children would see themselves as engaged in a series of games and play activities.

The educational base-line starts from the assumption that the best optical aids have been prescribed. The medical diagnosis tells the educator very little about the child's visual experience and perceptual skills.

The eighteen "skill units" in a special programme consist of ordinary tasks in a home or a classroom situation. The skills give much information in the training situation. The programme is called "Look and Think".

THE ASSESSMENT AND DEVELOPMENT OF VISUAL PERCEPTION FOR EDUCATIONAL PURPOSES

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Introduction and Summary

The Research Centre for the Education of the Visually Handicapped at the University of Birmingham have recently completed a three-year project which had two major aims:

1. the construction and validation of methods to enable school teachers to assess the visual perceptual abilities of severely visually handicapped children on entry to school at age five; the focus of attention was on those abilities and skills relevant to the classroom situation;

2. the design of teaching materials and procedures for strengthening those skills found to be under-developed by the assessment.

The impetus for the work was provided by the publication of Barraga's findings in the United States (Barraga, 1964) to the effect that many children classified as blind could be taught to perceive and order their near environment on the basis of visual as well as tactile cues. The Birmingham project tried to extend the scope of Barraga's investigation by means of an assessment procedure that would contain 'test' items covering two- and tree-dimensional objects, simple perspective, critical features, photographs, line drawings, symmetry, patterns, classification of facial expressions, identification from body postures, hand-eye co-ordination, and colour perception. The separate but associated teaching/learning procedures were designed so that the children would see themselves as engaged in a series of games and play activities.

Underlying Assumptions

Before a child can participate in this assessment and remediation programme, it is required that a previous medical/ophthalmological assessment should not have explicitly precluded encouraging him to try to make better use of his residual vision. In addition, it is assumed that the most appropriate spectacles, magnifiers, and other low vision aids have already been prescribed and fitted. This is the base-line from which the educational programme starts. The need for the programme to have its own assessment procedure is related to the conviction that the diagnosis, classification, and remediation procedures of the paediatrician, ophthalmologist, and ophthalmic optician tell the educators very little about the child's previous visual experiences and about his facility or competence in object perception, perception of form and outline, spatial perception, movement perception, and colour perception. These five traditional areas of investigation by psychologists are highly relevant to what goes on in the classroom, and the teacher must have some means of evaluating his pupils' competence on tasks involving these skills so that he can devise games and other activities that will require the exercise and refinement of those particular skills found to be under-developed. It follows from this that another major assumption is that "teaching - the structuring of experience - may have some useful, measurable effects on the efficiency with which the child searches for and handles information available to his eyes" (Tobin et al. 1977, p 2). In this respect, it is considered that the visually handicapped child may be different from his normally sighted peers who no doubt accomplish the greater part of their perceptual learning without the active interference or planning of their teachers. The opportunities for learning, and the reinforcement and verification of their judgements, are available in far greater quantity for young, normally sighted children. For visually impaired children, however, visual experiences and transactions are probably more piecemeal and disjointed, and lack coherence and clarity, both perceptually and conceptually. One function of schooling would, therefore, be the selection and ordering of visual activities so that what is unavailable in quantity and by chance can be provided intensively.

Assessment Procedures and Objectives

A set of 'test items' has been assembled to allow teachers to make direct observation of performance over a range of tasks which children will normally encounter in the ordinary home and classroom situation. This assembly is known as "The Look and Think Checklist". The Checklist comprises eighteen 'skill units', arranged to take into account ease of administration with children whose age and relatively brief attention spans are not conducive to long and continuous testing of their perceptual and cognitive abilities. The first four units use concrete objects (life-size and models) that involve naming, matching, and discrimination. The next nine units consist of two-dimensional representations requiring naming, describing, matching, discriminating, and classifying. In the next three units the child and/or teacher acts, draws, or actively participates in some other way. The list finishes with two units concerned with colour discrimination. Administration of the Checklist does not give rise to a standardized score or a perceptual quotient nor can it be used for ranking one child against another. It is, instead, an instrument for the orderly and structured observation of a child's current level of functioning, tabulating what the experienced teacher would register over a prolonged period of normal classroom observation of the child. It yields information about:

a. his pre-school experiences with objects and two-dimensional representations;

b. his facility with concepts referred to by expressions such as 'different from', 'nearer', 'farther', etc;

c. the distances at which he is able, or likes, to view his work;

d. some of the visual discriminations he can make;

e. the comprehensiveness of his search and scan activities;

f. his attention span;

g. the time he needs to complete simple and complex tasks requiring visual monitoring and checking.

A profile of performance can be plotted on completion of assessment, making it possible to see at a glance those skill areas that seem to be adequately developed and those that are under-developed or only partially developed. With this profile sheet in front of him, the teacher then picks out those areas in which he proposes to give the child specific practice (see Figure 1).

Remediation

For each of the skill units of the Checklist, a set of teaching/learning procedures has been developed. In some cases, there are already many kinds of commercially-produced materials available on the market; although all were designed with the needs of normally sighted children in mind they have been found, through actual use in experimental trials, to be beneficial for visually handicapped children, either in their existing format or through slight modification to their 'rules' or mode of use. In some instances, specially designed materials were produced and submitted to empirical validation; their construction is described in the teachers' handbook. In addition, simple paper and pencil games and group and individual activities have been described so that teachers can direct the children's attention to those behaviours and those cues that characterize and 'identify' objects, phenomena, and intentions. For some children, 'remediation' will only be meaningful in the context of reasonably large, concrete objects since their residual vision will be too low to enable them to cope with conventional two-dimensional drawings; for others, the partially sighted, practice on gross hand-eye co-ordination tasks will be a necessary precursor to subsequent hand-writing and even reading. The selection of teaching activities by the assessor/ /teacher will be dependent, therefore, upon a knowledge not only of the child's current level of functioning as indicated by administration of the Checklist, but upon professional experience and expertise. Nevertheless, such of the teaching is of a very informal, game-like nature, and it seems highly likely that parents could use some of the games and other procedures with children of preschool age. In so far·as the skills being exercised are relevant to both the home and the school situation, it is our belief that parents should be encouraged to follow up suggestions for 'teaching' after the teacher, psychologist, or other professional adviser has administered the Checklist to the child.

Conclusion

Any model for 'low vision rehabilitation' must be hierarchical in nature. Hierarchical, for example, in the sense that medical/ophthalmological diagnosis and remediation must precede psychological/educational diagnosis and remediation. The latter pre-supposes that optimal, optical correction has been provided, and that the appropriate lighting and other 'physical' conditions have been identified and prescribed. It pre-supposes, too, that the medical/ophthalmological examination will have indicated, if sometimes only in fairly general terms, the constraints or limits to which and within which the psychological/educational intervention ought to confine itself or which it must take account of (e.g. the range at which an aid should be used, the consequences of hemianopia, the implications of additional physical and sensory impairments). Such a model ought also to be exhaustive in that it identifies all the relevant determinants of behaviour - negative and positive - in the learners, in the stimulus conditions (size, shape, colour, etc), and in the support and service agents (the family; the school; and the medical, social, and psychological professions). It should go beyond the mere listing of the determinants by attempting to indicate their interrelationships and thus specify the time, duration, and significance of their 'intervention' or 'activation'.

One major advantage that might arise from constructing such a model would be the high-lighting of those areas where further servicing or research is required. It seems likely, for example, that much of our present 'failure' comes from the absence of an adequate back-up and monitoring service in relation to the use of low vision aids in the home and in school. Relatively little is known about how and when clients use the aids. Similarly, visual perception programmes for the congenitally handicapped in schools are rarely followed up on a long-term basis, with the consequence that little is known about transfer effects or about the importance of regular in-service training and retraining programmes for teachers. An adequate model would help to make explicit those needs and communication channels that arise, or should arise, when an assessment and remediation procedure has been established. Our own work can be seen to fit into the posited second stage of such a model but we must be honest and declare that we have not done all that ought to be done if the children's needs are to be met. If the intention is to persuade the so-called developing countries to take a greater interest in low vision subjects, then it is incumbent upon professional workers to go beyond the boundaries of their own investigations and show how an integrated system of identification, diagnosis, and remediation should operate.

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FIG. 1

EXAMPLE OF COMPLETED SUMMARY AND PROFILE SHEET FOR "LOOK AND THINK" CHECKLIST

SKILL	SCORE GRADING			PROFILE		
	Under Developed	Partially Developed	Developed	Under Developed	Partially Developed	Developed
1. Naming: 3-D Objects	0 1 2	3 4	⑤			X
2. Naming: 3-D Models	0 1 2	3 4	5 ⑥			X
3. Discrimination: 3-D	0 1 2	3 4	5 ⑥			X
4. Matching: 3-D	0 1 2	3	4 ⑤			X
5. Matching: 2-D	0 1 2 3	4 ⑤ 6	7 8		X	
6. Simple Perspective: 2-D	0 1 2	3 4	⑤			X
7. Using Critical Features: Exploded Drawings	0 1	② 3	4		X	
8. Naming & Describing: Photographs	0 1 2	3 4	⑤			X
9. Naming & Describing: Drawings	0 1 2	3 4 5 6	7 ⑧			X
10. Perception of Symmetry	0 ① 2	3 4	5	X		
11. Perception of Patterns	0 1 ②	3 4	5	X		
12. Classifying Facial Expressions: Photographs	0 ① 2 3	4 5 6 7 8 9	10 11 12	X		
13. Identification from Body Postures: Drawings	0 1 2	3 4	⑤			X
14. Perception of Gestures and Body Movement	0 1	2 3	④			X
15. Hand-Eye Co-ordination: Paper & Pencil Maze A	46 upwards	36-45 secs.	35 secs. & lower			X
B	51 upwards	46-50 secs.	45 secs. & lower			X
16. Hand-Eye Co-ordination: Magnet Board	0 1	2 3	5 upwards			X
17. Colour Differentiation	0 1 2	3 4 5 6	⑦			X
18. Colour Naming	0 1 2	3 4 5	⑥			X

UNDER DEVELOPED AND PARTIALLY DEVELOPED SKILLS FOR REMEDIATION:

Perception of symmetry and patterns; classifying facial expressions (photographs)

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